COLONY OF MAURITIUS

Annual Report of the Department of Agriculture for 1938.

IMPERIAL MYCOLOGICAL INSTITUTE

[Price R.1.05 cents]

PRINTED AND PUBLISHED BY
J. O. TERRIÈRE, AG. GOVERNMENT PRINTER,
PORT LOUIS, MAURITIUS.
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ANNUAL REPORT OF THE DEPARTMENT OF AGRICULTURE, FOR THE YEAR 1938.

No. 43/39.

THE HONOURABLE THE COLONIAL SECRETARY,

I have the honour to submit the report on the Agricultural conditions of the Colony and the work of the Department of Agriculture for the year 1938.

PART I

GENERAL REPORT ON THE AGRICULTURAL CONDITIONS OF THE COLONY AND THE WORK OF THE DEPARTMENT OF AGRICULTURE DURING THE YEAR 1938.

1.—Meteorological Conditions.

In the following table are reviewed the rainfall and temperature conditions which prevailed at the Central Experiment Station, Réduit. More extensive figures regarding the climate of the Station are given in Appendix I.

TABLE I.

Months and Years 1937	Air Temperature °C	Departure from Normal °C	Rainfall mm	Departure from Normal %
November	22.4	+0.6	77.9	+24
December	23.2	−0.2	43.9	−73
1938				
January	24.2	+0.1	71.2	−73
February	24.6	+0.3	235.1	−16
March	24.1	+0.4	261.5	−14
April	22.4	−0.2	64.8	−53
May	20.9	+0.4	133.2	+19
June	18.4	−0.2	30.5	−66
July	18.5	+0.5	52.7	−21
August	17.6	−0.2	31.9	−49
September	18.4	−0.2	17.1	−60
October	19.8	0.0	49.3	+ 2
November	20.9	−0.9	32.6	−45
December	22.8	−0.6	22.2	−86

From the above figures, it will be seen that during the growing season (November to July) temperature conditions were generally favourable, while moisture was generally deficient. During the harvesting season, both rainfall and temperature conditions were very satisfactory. The year was remarkably free from cyclonic disturbances in the vicinity of the Island.

Cane yields were appreciably below last year's, especially in the Northern districts: for the whole Island, the deficit on 1937 approximated 5%. On the other hand, as a result of favourable weather during the ripening season, the sucrose content of the cane was exceptionally high and more than set off the decrease in cane weight.

2.—Sugar Production.

The total cane reaped approximated 2,690 thousand metric tons, in defect by 133 thousand metric tons on last year's production. The sucrose content of the cane was considerably in excess of last year's averaging, for the whole Island, 13.87 as against 12.99 in 1937.

The mean extraction of sugar per cent cane was the highest on record, reaching 11.95% as against 11.12 last year. The previous maximum was 11.79 in 1936.

The exceptional richness of the cane has more than compensated the decrease in cane weight and, as a result, the Colony's total production of sugar has reached the unprecedented total of 321.31 thousand metric tons.

The following table exhibits the comparative production for the past seven years:

TABLE II.

PRODUCTION OF SUGAR IN THOUSAND METRIC TONS.

Districts	1938	1937	1936	1935	1934	1933	1932
Pamplemousses and Riv. du Rempart	76.60	82.65	63.97	69.97	30.13	57.77	62.73
Flacq	50.09	48.16	49.98	44.15	30.87	41.37	35.97
Moka	42.08	37.72	43.42	35.76	29.30	40.08	34.12
Plaines Wilhems	24.24	22.49	21.39	20.62	11.54	18.22	17.05
Black River ...	13.36	13.81	12.85	11.28	5.99	8.88	9.06
Grand Port ...	59.45	57.23	56.10	53.38	38.37	50.66	46.66
Savanne ...	55.49	51.76	52.13	45.34	32.66	44.48	41.63
Total ...	321.31	313.82	300.34	280.50	178.86	261.46	247.22

The yearly progress, during the past seven years, was interrupted only in 1934 owing to severe drought. There is no doubt that the extension of better varieties is playing a most important part in this unparalleled progression and to gauge the importance of this factor an investigation was conducted on the present distribution of cane varieties on Estates.

3.—Sugar Cane Varieties grown on Estates.

A census of varieties of cane cultivated on Estates was carried out during the year. The last survey of this nature was performed in 1933. During the

five years elapsed, BH.10/12 increased from 7% of the total acreage on Estates to 37% ; Tannas, mostly white, which in 1933 occupied 53% have been reduced to 38%. The following table indicates the nature of the change which has taken place since 1933:

TABLE III.

Varieties	1933 %	1938 %
Tannas	53 ...	38
BH.10/12	7 ...	37
M.55	5 ...	1
M.131	5 ...	1
D.K. 74	6 ...	1
R.P. 8	4 ...	½
D.109	4 ...	3
R.P. 6	2 ...	½
D.130	2 ...	½
252	1 ...	½
M.27/16	1 ...	3
P.O.J.213	2 ...	¾
55/1182	1 ...	1¾
Rich Fund	1 ...	½
Other Varieties ...	6 ...	11

Under "other varieties," P.O.J.2727 occupied nearly 2% and P.O.J.2878, 3% M.13/18 is meeting with increased appreciation and reached 1% of the total.

4.—Grades of Sugar.

The proportion of Raws was, this year, 87.2% of the total sugar made ; granulated whites (Vesous) were 12.5%, while low sugars were only 0.3%. The change brought about by the introduction of the new English Tariff in 1936 is illustrated in the following table:

TABLE IV

Years	Vesous	Raws	Low Sugars
1925 ...	98.21 ...	— ...	1.79
1926 ...	98.10 ...	— ...	1.90
1927 ...	98.63 ...	— ...	1.37
1928 ...	71.80 ...	27.30 ...	0.90
1929 ...	23.90 ...	75.20 ...	0.90
1930 ...	16.80 ...	82.50 ...	0.70
1931 ...	16.20 ...	83.10 ...	0.70
1932 ...	12.10 ...	87.50 ...	0.40
1933 ...	11.80 ...	87.70 ...	0.50
1934 ...	20.56 ...	78.76 ...	0.68
1935 ...	12.60 ...	87.10 ...	0.30
1936 ...	21.68 ...	77.85 ...	0.47
1937 ...	16.00 ...	83.70 ...	0.30
1938 ...	12.50 ...	87.20 ...	0.30

5.—Area under Sugar Cane.

At the beginning of 1938, the area under cane was estimated at 145,096 acres, in excess by nearly 1,600 acres on the figure for 1937.

Estates with factories cultivated 60,331 acres ; estates without factories, 41,935 acres giving a total estate cultivation of 102,266 acres, in excess by 1,200 acres on the figure for last year.

The estimated balance of 42,830 acres consists almost entirely in lands owned and worked by Indian small proprietors.

The total area under cultivation by Indians amounted at the beginning of 1938 to 56,025 acres as against 55,053 at the beginning of 1937.

6.—Sugar Market.

In 1938, the market for sugar was generally weak and the average selling price obtained at the end of December, for a total sale of 183,514 metric tons, was only Rs. 5.65 net per kilos approximately.

The average sale price for the 1937 production was Rs. 6.103 net per 50 kilos.

7.—Disposal of the 1937-1938 sugar production and local consumption.

The total sugar exported during the 1937–38 year (August 1st, 1937, to July 31st, 1938) amounted to 303,100.2 metric tons, distributed as follows:

	Metric Tons
Great Britain	279,300.7
Canada	22,415.4
Hong Kong	1,130.8
Other places	253.3
Total	303,100.2

The exportation for the 1938–1939 crop, totalled up to December 31st, 1938, 147,377.3 metric tons, distributed as follows:

	Metric Tons
Great Britain	146,038.3
Hong Kong	1,223.0
Other places	116.0
Total	147,377.3

The local sugar consumption for the 1937–38 year was 11,367 metric tons, as against 10,326 in 1936-37 and 9,327 in 1935-36.

8.—Labour and Cost of Living.

Early in September a strike of dockers paralysed during a few days the whole machinery of sugar fabrication. The strike was quickly and efficiently dealt with and, thereafter, crop progress went smoothly onwards.

The cost of living remained practically stationary during the year. During the first half of 1937 the index was 98.0, and during the second half

year 98.3 as against 100 in 1914. Rice, the staple food of the population, remained steady at index 65 ; other grains oscillated between 106 and 111. Flour was 121 and oils and fats, 63. Fresh meat was at 113.

9.—Sugar Machinery.

Machinery, to the value of Rs. 1,162,726 was imported during the year as compared with Rs. 914,545 in 1937. The value of the tramway material imported in 1938 was Rs. 237,666 as against Rs. 128,059 in 1937.

11 Farm tractors and 27 ploughs to the aggregate value of Rs. 11,540 were also imported in 1938.

10.—Fertilizers.

A total of 17,726,955 kilos of chemical fertilizers, valued at Rs. 2,207,974 was imported in 1938, as against 19,818,236 kilos valued at Rs. 2,117,295, the year previous. Of the total importation, 63% consisted in Ammonium Sulphate and 25% in Potassium Nitrate.

11.—Insect Pests.

Hand collection of Phytalus beetles as a measure of control is now extinct and the routine check experiment at Trianon Estate has indicated no significant difference between larval infestation following intensive hand collection and that in the adjoining, uncollected area. A very considerable sum of money has thus been saved and becomes available for the policy of searching for further, possible parasites of Phytalus in other countries. In this connection Natal, Zanzibar, France and French Morocco have received attention from members of the Entomological Division and several quite useful parasites have been secured. This work continues with projected tours of Cape Province and further visits to the Middle East.

It is interesting to note that a decrease of this pest in one area of the Island is associated with the phenomenal progress of a Javanese parasite brought in some years ago.

At long last the Giant Toad has arrived in Mauritius and if the difficulties experienced in its introduction are any criterion as to its future services as a predator, then Phytalus may indeed regard its future with a sense of gloomy foreboding.

With regard to the depredations of this pest on different cane varieties, it is interesting to note the preference for a quick maturing cane planted somewhat late in the year suffering one attack of Phytalus at a period when the plant is firmly established and yielding 25-30 tons in the following November—thus producing a stronger ratoon against the next onslaught of this beetle. The correlation in connection with silica content of cane roots—as observed in the report of the Botanist of the Sugarcane Research Station—is also remarkable.

Moth borers of sugar cane are now stepping into the picture once more and the anxious attitude of several estate proprietors has been met by a grant from the Colonial Development Fund to cover the expenses of searches for parasites in Ceylon, India, Java as well as the importation of some useful West Indian borer parasites. A mission has already proceeded to Ceylon.

The wilt of pineapples in Mauritius, thanks to the concerted efforts of the Divisions of Plant Pathology and Entomology, has now definitely been traced to the presence of a mealy bug. The Entomologist has spared no effort in producing an effective spray for this pest as well as a suitable machine for its application.

As for the tobacco beetle there is no doubt that vacuum fumigation will have to be installed if this insect is to be prevented from further interference in the tobacco industry.

12.—Plant Diseases.

The reputation and activities of the Division of Plant Pathology are now in the keeping of Mr. P. O. Wiehe, B.Sc., A.R.C.S., F.L.S., a former Laureate of the College of Agriculture.

Diseases of sugar cane received the usual routine attention both in the field and laboratory. An interesting event was the occurrence of Red Rot on Selangor Seedling and M.73/31 in many districts of the Island.

A survey of tobacco diseases yielded the observation that certain of the maladies are of greater relative importance in some districts than in others.

Perhaps the major accomplishment of this Division during the period under review was the tracing of the relationship between Wilt Disease of the pineapple and the presence of the mealy bug *Pseudococcus brevipes* Ckll. The problem of this destructive malady has occupied the Division for a considerable time.

Another prominent event was the detection of an apparently new coconut palm disease in Rodrigues by the Plant Pathologist. The symptoms of the disease take the form of most remarkable lesions in the trunk. Careful attention is being paid to this malady as the possibilities of developing the cultivation of this palm in the Dependency are not inconsiderable.

The Plant Pathologist, prior to his appointment, had performed on behalf of the Imperial Chemical Industries Ltd. and in collaboration with Professor Robb a series of experiments in the treatment of local pastures. Thus his knowledge and experience have come in useful to this Department in connection with pasturage research in different parts of the Island.

13.—Tobacco Industry.

The excess production of leaf tobacco during 1937 —which is referred to in the Annual Report for the year— necessitated a considerable reduction in acreage during the year under review. The quantity of leaf produced in excess of the Tobacco Board's requirements from the 1937 crop totalled kilos 137,210.5. The Board decided to accept this leaf and consider it as forming part of the 1938 crop and, in allocating the quantities to individual growers during 1938, each planter who had produced excess leaf during 1937 had his 1938 quota reduced by an amount equal to his excess production of the previous year. In some few cases the excess production exceeded the quota to be awarded during 1938 and in all these cases no certificate for production during the year was granted. The payment for the excess leaf was effected in three instalments during the year.

In an endeavour to keep production more within the limit of the Board's requirements a different system of allocating quotas was adopted for the year under review. The system was adopted from the recommendations contained in a report submitted by the Tobacco Officer after studying the organisation of Marketing Boards in Great Britain. Under this system each grower was awarded a basic quota and basic acreage; these were equivalent to the quantity of tobacco produced and the acreage cultivated during 1937. Before allotting the quota and acreage for the year to each grower, the Board estimated its requirements, after which each grower was awarded a quota which was in like proportion to his basic quota as the Board's estimated requirements were to the total of the basic quotas. In previous years the Board had awarded a general quota of 500 kilos per acre, but under the system described above the quotas awarded varied between 500 kilos per acre and 1,200 kilos per acre according to the growers recorded yields.

By the end of the year it was evident that the new system of issuing quotas was resulting in production being kept more within the limits of the Board's requirements and there is little likelihood of production being in excess of these requirements.

The Board's estimated requirements were, after deduction of the excess production of the previous year:

	Kilos
Flue cured	103,507
Air cured	61,411
	164,918

and certificates were issued for the cultivation of 278.37 acres divided as follows:

	No. of Growers	Acreage
Flue cured ...	46 ...	189.16
Air cured ...	275 ...	89.21
	321	278.37

The flue cured leaf is produced chiefly by the large estates though individual acreages are not great. The largest during 1938 was 16.5 acres and the smallest 15 perches, with an average of 4.11 acres per grower.

The air cured leaf is produced mainly by small peasant cultivators and acreages are small. During the year under review the largest was 3.75 acres and the smallest 2 perches, with an average of 32 perches per grower.

The amount of leaf delivered by Mauritius growers to the Government Tobacco Warehouse during the year and its value was:

	Quantity Kilos	Value Rs. cs.
Flue cured ...	116,470.0 ...	109,572.74
Air cured ...	93,584.8 ...	72,666.89
	210,054.8	182,239.63

and in addition kilos 33,946.6 of a value of Rs. 23,584.72 were received from Rodrigues.

The above figures include part of the previous year's crop as the crop year terminates during January or February.

The quality of leaf delivered during 1938 was well below the average of previous years and there has been a gradual falling off during the past few years. This was the subject of special consideration by the Tobacco Division and it would seem that the deterioration in the quality is largely due to faulty selection of seed plants. In consequence of this it is planned to supply all planters with approved seed in future years which will be selected at the Tobacco Station.

The amount of local leaf used by Manufacturers during the year was 338,525 kilos as compared with 329,038.3 kilos in the previous year. There has been a steady increase in the amount of leaf used by Manufacturers during the past five years, viz:

	Local Kilos	Imported Kilos	Total Kilos
1934 ...	299,109.0 ...	22,489.0 ...	321,598.0
1935 ...	299,672.1 ...	23,272.3 ...	322,944.4
1936 ...	303,750.8 ...	23,719.4 ...	327,470.2
1937 ...	329,038.3 ...	25,765.2 ...	354,803.5
1938 ...	338,525.0 ...	27,799.0 ...	366,324.0

Research.—Trials with new varieties were continued at the Tobacco Station and a large number of strains tested and, whilst the majority are far superior to the Amarello variety in so far as flavour is concerned, a number are extremely promising. Further selections were made for further trials on a larger scale during the ensuing year.

The field work of the Government Tobacco Officer has been supplemented by the appointment of an experienced chemist who, working in the Chemical Division, has devoted much time to research into the causes of the well known "tang" in Mauritius leaf. An account of this work appears in the report of the Chemist of this Department.

Twelve growers situated in different districts of the Island were awarded two acres for the cultivation of new varieties and the results obtained justify an extension of their cultivation.

Experiments were carried out at the Tobacco Station in curing tobacco with the aid of acetylene gas and the results achieved were outstanding and are being made the subject of a preliminary report by the Tobacco Officer in order to bring this method to the notice of growers. Samples of leaf cured in the normal manner and by the aid of acetylene gas are being forwarded to London for report.

Towards the end of the year the Colonial Development Fund approved a grant for the establishment of a Tobacco Research Station and work was commenced on clearing the land. At this Station trials with new varieties, selection and breeding experiments will be conducted in an effort to obtain a strain of tobacco suitable for the export market. The opening of this station will enable the small Tobacco Station at La Ferme to be used as a seed supply station.

14.—Aloe Fibre.

Throughout the year, the market for Mauritius fibre was practically non existent. The total exported in 1938 was 212.5 metric tons, as against 1,616.7 in 1937.

No action has as yet been taken regarding the reopening of the fibre bag factory.

15.—Pineapple Industry.

The area under this crop has been markedly increased and now totals 125 acres approximately. Unfortunately, weather conditions have been by no means favourable and the yield in fruit has been below anticipation. Disease caused especially by wilt has been much in evidence. The question is receiving the full attention of the Department.

The anticipated turn-out of the Fruit Canning Factory for 1938–39 is 3,000 cases or, approximately, 75,000 kilos. Figures for previous years are as follows:

Years	Cases
1931–32	4,224
1932–33	4,982
1933–34	2,300
1934–35	2,188
1935–36	2,960
1936–37	3,118
1937–38	3,145

The exportation in 1938 was valued at Rs. 35,762 as against Rs. 32,451 in 1937.

An interesting new venture is the exportation of fresh letchis. In 1938, the total exported was 27,927 kilos valued at Rs. 10,923.

16.—Tea Industry.

Progress continues to be satisfactory, especially in regard to the quality of the tea produced. New and improved machinery has been installed at the Bois Chéri Factory.

At Bois Chéri Estate, the yield for 1937–38 was 41,000 kilos. Figures for previous years are as follows:

Years	Kilos
1932–33 ...	9,500
1933–34 ...	10,000
1934–35 ...	27,880
1935–36 ...	24,750
1936–37 ...	34,650

At Curepipe tea garden, the production for 1938 was 19,718 kilos. Figures for previous years are as follows:

Years	Kilos
1931	8,713
1932	8,688½
1933	12,251½
1934	13,425½
1935	12,600
1936	13,000
1937	15,062

17.—Coconut Industry.

The export of copra—product of the dependencies of Mauritius—in 1938 was 1,482 metric tons valued at Rs. 213,765 as against 1,507 tons, valued at Rs. 350,012 in 1937. The export of coconut oil during the year was 1,476 litres, valued at Rs. 550 as compared with 5,731 litres valued at Rs. 2,383 in 1937.

18.—Alcohol.

The total quantity of alcohol distilled for human consumption amounted to 841,610 litres as against 703,396 litres in 1937. The quantity distilled for industrial purposes was 572,350 litres as against 603,192 litres in 1937. The exportation of rum during the year was 144,982 litres, valued at Rs. 45,264 as compared with 84,210 litres valued at Rs. 27,181 in 1937.

The question of further utilization of power alcohol has been receiving consideration during the year.

19.—Veterinary and Live Stock.

Owing to scarcity of rain and consequent lack of fodder, cattle in herds have been doing rather poorly, and, towards the close of the year, numerous deaths occurred especially of old or very young animals. In spite of adverse climatic factors, disease has been little in evidence during the year.

The animals ordered in connection with beef improvement campaign have been received. The cows have been temporarily stationed at the Government Dairy. The bulls have been in great demand by Breeders. Fertilization of pastures is being also seriously considered by stockowners.

With a view to promoting the development of a local industry of beef production the establishment of an experimental farm on Crown Land Palmar in Flacq was started during the year. The area selected covers about 100 acres and is typical of pasture land as it exists in Mauritius to-day, including *Stenotaphrum* plains (" Chiendent bourrique ") on calcareous sandy soil and *Leucœna* (" Acacia ") scrub on slightly laterised rocky soil.

The farm is divided up into 8 paddocks, four of 10 acres each on sandy soil and 4 of 13.5 acres each on rocky soil. The first four paddocks are composed of *Stenotaphrum* while in the others *Leucœna glauca* is dominant. The two series of paddocks are divided by a corridor leading to the farm buildings which include three stables, overseer's quarters, office labourers' quarters, dipping tank, silos, and fly traps. In addition there are two small enclosures for experimental work on individual species under different soil conditions.

The chief lines of pasture research for the present aim at an improvement in the productivity and quality of the existing herbage and comprise:

(1) the effect of light and hard grazing on *Stenotaphrum* plains under manured and unmanured conditions ;

(2) the effect of light and hard grazing on *Leucœna glauca ;*

(3) the manurial requirement of *Stenotaphrum* and *Leucœna glauca* growing under different soil conditions ;

(4) the seasonal variation in productivity and mineral content of the commonest pasture species of Mauritius ;

(5) the establishment of new pasture plants including experimental work on the feeding value of the Uba cane and first and second nobilizations of *Saccharum spontaneum*.

Simultaneously with the pasture work there will be undertaken a scheme of stock breeding along the lines laid down by Professor Robb in his report. This scheme includes:

(1) the breeding of pure bred " Charolais ";

(2) the breeding of pure bred " Afrikander ";

(3) breeding of improved beef cattle by grading up from local (créole) females towards pure bred " Mauritian Charolais " and " Mauritian Africander ";

(4) breeding of " pure " creole cattle.

There will be for the present three herds of 12 cows and one bull, namely a Charolais, an Africander, and a creole herd. The Charolais and Africander herds will include a number of selected creole cows in addition to the pure bred animals.

Experimental work on fly control and the making of silage will also be carried out at the farm.

At the begining of 1938, the total Bovine on estates numbered 13,121 as against 13,646 the year previous. The total sheep on Estates was 1,922 while goats numbered 4,914.

Importation of bullocks from Madagascar for food purposes amounted to 3,579 heads, valued at Rs. 238,458

20.—Co-operative Credit Societies.

The so-called small planter in Mauritius is becoming more alive to his interests especially in those matters of finance which are closely related to sugarcane cultivation—his staple product.

This attitude is reflected in his increasing awareness as to the possibilities of the Co-operative Credit System. The call is now all for new Societies ; in fact the demand has outstripped the existing system of official control which has resulted in a waiting list.

This is most satisfactory but at the same time it is a matter of some embarrassment ; for the hasty formation and financing of societies is not countenanced by the Registrar and his staff who hold that a thorough explanation with not a little education in co-operative principles is essential before the accumulation of funds and granting of loans can be embarked upon.

A valuable feature of these Societies is the accessibility thus brought about of the small planter to advice on cultivation matters emanating from the Department of Agriculture. This has been appreciated by the institution of planting material and demonstration plots, a considerable development of which has taken place during the year.

The control which the Registrar exercises over the movement remained unrelaxed during the period under review. Nowadays it is not an easy matter for a member of any Co-operative Credit Society to stray from the paths of financial virtue.

21.—Rodrigues.

The Dependency experienced a more or less disastrous year as far as agriculture was concerned. Dry years are not uncommon in Rodrigues but the intensity of the dry spells during 1938 will not easily be forgotten by the agricultural community.

Such inimical climatic conditions not only retard actual agriculture but prove a serious setback to all schemes of agricultural improvement. Thus, improvement of pastures, to which the Superintendent refers in his report, received a severe check owing to the death of many young trees utilized as shade. Likewise, extension of coconut plantations deteriorated.

Despite these depressing events which, incidentally, are not the complete tale of drought misfortune, it is interesting to observe that the practices of manuring and terracing are becoming more popular: these are fundamentals and will have far reaching effects in ameliorating the position of the agriculturist. The policy of deputing at least one officer of this Department to visit Rodrigues annually is being pursued with valuable results.

The possibilities of irrigation in the Dependency have not been finally dismissed.

22.—General.

I wish to record my deep appreciation of the measure of assistance which I have unhesitatingly been accorded by the staff of the Department during the year.

The work of the Sugarcane Research Station and the various Divisions has, as usual, been conducted in an atmosphere of close co-operation with the planting community of the Island. To the very large number of cultivators—members of all classes of the community—who have afforded opportunities for special investigations I take this opportunity of presenting the gratitude of this Department.

G. E. BODKIN,
Director of Agriculture.

Réduit,
May 19th, 1939.

PART II

REPORT ON THE SUGARCANE RESEARCH STATION AND DIVISIONAL REPORTS OF THE DEPARTMENT OF AGRICULTURE

SUGARCANE RESEARCH STATION

General.

During the year, the staff of the Sugarcane Research Station has once again been brought up to full strength, by the appointment of Mr. G. C. Stevenson, B.A., A.I.C.T.A., formerly Assistant Botanist of the B. W. I. Sugarcane Breeding Station to the post of Geneticist. This Officer arrived in the Colony on the 27th July, and assumed duty the following day. Mr. S. Dupont de Rivals St. Antoine, a diploma holder of the Mauritius Agricultural College, was appointed as extra field assistant for the carrying out of cultural experiments, etc., with sugarcane.

Steady progress has been made with the research work in all three divisions, a brief account of the work being given below by the officers in charge of the various divisions. It is pleasing to be able to record once again that the acreage planted with the released varieties bred by the Sugarcane Research Station is showing a constant increase, so that during the crop season of 1939, a fairly big tonnage should go to the factory. No new varieties have been released during the year, although several promising ones are under observation.

The Senior Chemist was appointed member of the Committe to investigate the purchase of planters' canes on a quality basis, and he also sat on two sub-committees appointed by the former, one dealing with the technical aspect of the problem, and the other dealing with the question of Uba Rich Fund canes in the Lallmatie area and other areas. In all 14 meetings of the first-mentioned committee were held, and at the last one the Senior Chemist, together with the Director of Agriculture and Sugar Technologist were deputed to interview the Managers of all factories receiving planters' canes, and also middlemen and small planters. Thirty-one factories have been visited during the course of this investigation, and the middlemen and representatives of small planters will be interviewed early in 1939. The " Uba " sub-committee has held two meetings, one to discuss the *modus operandi* and the other in the fields to study the question on the spot.

Two meetings of the Advisory Committee of the Sugarcane Research Station were held during the year, the first to discuss the report for 1937 and the research programmes for 1938, the second taking the form of a visit to Pamplemousses Experiment Station, to see the methods of raising and testing new cane varieties actually being employed.

ANNUAL REPORT OF THE

GENETICIST DIVISION

Introductory.

The writer arrived in the Colony on July 27th, 1938. Since February 6th, 1937, when Mr. A. G. G. Hill left the Colony, the work of the Division has been carried out under the direction of Mr. N. Craig, Senior Chemist.

Cane Breeding.

Favourable conditions were experienced at both experiment stations, and satisfactory germinations obtained. Ninety seven distinct crosses were made at the Central Experiment Station, and ninety-nine at Pamplemousses Experiment Station. These included noble cane crosses, and nobilisations of *Saccharum spontaneum*, *S. barberi* and *S. sinense*. Approximately 26,500 seedlings were obtained at Réduit, and 43 000 at Pamplemousses. Seedlings were planted in the field in November and December 1938, and January 1939, 7,221 at the former station, and 6,695 at the latter.

First-Year Trials.

During the year, 11,892 first year seedlings were reaped at the Central Experiment Station in November and December, of which 108 were selected, or 0.9%, while the corresponding figures for Pamplemousses Experiment Station were 115 selected from a total of 9,951 or 1.0%. Owing to the poor growth made by the previous season's first year seedlings, selection was deferred until January and February of the year under review. Of these 153 seedlings were selected from a total of 10,804, or 1.4% at Réduit, and 77 from a total of 7,756 or 1.0% at Pamplemouses. All selected seedlings were planted in multiplication plots to provide planting material for second-year trials. After selection, population performance figures were worked out on the basis of the percentage of seedlings selected from each cross. These will be used to guide the breeding work, the aim being to improve the general level of seedlings in the first year trial by the exclusion of crosses yielding a poor type of progeny.

Second-Year Trials.

Six second-year trials were planted at Pamplemouses Experiment Station. Eighteen such trials were reaped at the Central Experiment Station and eleven at Pamplemousses Experiment Station. At the former station nineteen seedlings were selected for further trial from a total of one hundred and forty-six, and at the latter station, twelve from a total of eighty-seven. Selections from these trials are allocated to third year trials and to gumming disease resistance plots.

Third-Year Trials.

One trial was planted at the Central Experiment Station, and five at Pamplemousses Experiment Station, while seven were reaped at the former station and two at the latter. Three seedlings were selected for further testing, from this series of trials. These are M.211/33 and M.213/33, both noble canes from the cross R.P.6 x M.23/16, and M.130/32, a nobilised Glagah variety whose parentage is R.P.6 x POJ.2878. These have been planted in multiplication plots to provide planting material for variety trials.

Variety Trials.

Rainfall during 1938 was, on the average, considerably below the mean for the past thirty years, but ripening conditions were excellent, and sugar production reached a record for the island. Six variety trials were reaped at the Experiment Stations, and thirteen on estates. These were mainly concerned with the performance of the released varieties M.171/30, M.72/31, M.75/31 and M.134/32, under various conditions. M.75/31 proved disappointing largely due to the damage done to its standing canes by borers and red rot infection, and the writer cannot recommend its propagation at present. The other three varieties gave very satisfactory results, consistently out yielding the standard varieties by a significant margin. From the applications for planting material of these varieties to the Agricultural Division of the Department of Agriculture, it is evident that large acreages will soon be under cultivation. During the year six further variety trials were laid down on estates under widely differing conditions, mainly with the object of ascertaining the most favourable regions for the growth of each of these varieties.

Gumming Disease Resistance Trials.

These are carried out in co-operation with the Plant Pathologist, Department of Agriculture, with the object of obtaining information on the degree of resistance of seedlings selected from second-year trials. Those seedlings which prove susceptible, are excluded from further trial. In addition, information on the inheritance of gumming disease resistance is obtained from year to year, which is used to guide the breeding work. During the year, all second year selections were planted in gumming disease plots.

Phytalus Resistance Trials.

Little information is yet available on the subject of varietal differences in resistance to phytalus attack, but trials were begun during the year, in co-operation with the Botanist, Sugarcane Research Station, and the Entomologist, Department of Agriculture, with the object of obtaining information on this important subject. A large trial at Britannia S.E., including thirteen varieties from a wide range of parental types, was planted in August, while five smaller trials have been started on estates where phytalus attack is severe. These smaller trials aim to test the value of M.167/32 and M.168/32, two non-arrowing POJ.2878 x Uba Marot seedlings. M.168/32 has given promising results, and is a vigorous seedling of fair juice quality, which it is hoped will prove resistant to the pest.

Despatch of Sugarcane fuzz to South Africa.

Fuzz from three crosses was sent to the Director of the Experiment Station of the South African Sugar Association, in connection with the scheme of raising, in that country, seedlings from crosses made in Mauritius.

G. C. STEVENSON,
Geneticist.

CHEMICAL DIVISION

The chief line of research carried out in this division has been that of leaf analysis with a view to diagnosing plant food deficiencies in the soil, together with work on soil potash and the routine analysis of soils in connection with manurial trials. In the field, a number of manurial trials were reaped, and fairly large numbers were laid down by two extra field assistants.

Leaf Analysis.

A large number of analyses were carried out with the object of trying to assess the value of this method for determining the lack of plant food in the soil. Samples of leaves were taken for several varieties, one-half of the sample being analysed normally and the other half was separated into lamina and midrib, which were then analysed separately. On an average, the lamina contained about 3 times as much as nitrogen, 2 to 3 times as much P_2O_5 and half as much potash as the mid-rib. Care must be taken, therefore, to see that proportion of lamina and mid-rib in the sample for analysis is truly representative. Leaves of different rank were also analysed, and it was found that whereas the nitrogen and phosphoric acid contents remained nearly the same in the 2nd to 5th leaves from the top, there was a progressive drop in postash as the leaves become older, and consequently leaves of the same rank should always be employed.

Periodical analysis of leaves taken from variety and manurial trials were made with several objects. The first object was to determine the influence of season, the next to see to what extent varieties differed when grown under as nearly as possible identical conditions, and thirdly to see whether fertiliser applications are reflected in the composition of the leaves.

The season at which the leaves are sampled appears to have some effect on the absolute quantity of such constituents and also upon their relative quantities. Thus, in one trial, sampled in February, April and July, the sum of $N + P_2O_5 + K_2O$ was 3.13% 3.98% and 3.65%, respectively. During the same period there was a slight rise in the proportion of nitrogen to total plant food, the figures being 32.7% 33.7% and 34.9%, whereas there was a continuous drop in P_2O_5 from 11.7% to 10.8% and 9.7%. The proportion of K_2O in the experiment remained almost constant.

Several variety trials were sampled to ascertain the effect of variety, and some variations were noted for different varieties, but in general these variations were fairly constant for the different varieties in different localities.

Analyses of leaves from manurial trials, in which definite responses were obtained, showed that leaves from incomplete fertiliser plots were definitely poorer in the element omitted from the fertilisers applied.

Fixation and Retention of Potash in Mauritius Soils.

Potash is an expensive form of fertiliser per unit in the fertilising of sugar cane, and the fate of this element when applied to the different soils in the Colony is therefore of prime importance. Does it revert to a form which is not available for plant growth, or is it washed out of the soil by the first heavy rainfall and so completely removed from the sphere of action of the

sugar cane roots? Some laboratory work has been performed with the object of answering these questions. In no normal soil, formed by lateritic alteration, was any sign of reversion to a non-available form discovered. In a grey soil, formed by a clay alteration, however, fixation of added potash in a non-exchangeable form was shown to take place to a moderate extent. The retention of K_2O in an available form was only tried in one soil, *i.e.* from Réduit, a soil with a medium degree of laterisation. This soil was placed in a tube 12 ins. long, and potash was applied in solution to the surface as potassium chloride at the rate of 40 kgs. K_2O per acre. Distilled water was added from time to time until it was equivalent to 10″ rainfall. The chlorine was recovered quantitatively in the leachate, but no potash was discovered, showing that with a rainfall of 10 inches percolating the soil, practically all the potash would still remain in the zone of action of the sugarcane roots.

Manurial Trials.

A number of field trials were reaped, the most interesting of these being two showing the effect of potash. One of these was situated at Cascade, Rose Belle Sugar Estate, and in this trial the omission of potash from the fertiliser mixture resulted in a reduction of over 20 tons of cane per arpent, and also in a big reduction in the sucrose %cane. The other, at the Central Experiment Station, Réduit, showed a reduction of about seven tons of cane per arpent, where no potash was applied and once again the cane in these plots was less rich than that from the other plots. The question of the effect of potash upon sucrose accumulation is being further studied.

Demonstration plots at St. Julien D'Hotman, Lallmatie district and Solferino on small planters' lands are being continued. The results so far obtained are insufficient to warrant any definite recommendation as to suitable varieties to be grown in these inferior lands, but the plots have shown that the effect of phosphatic guano is very marked.

N. CRAIG,
Senior Chemist.

BOTANICAL DIVISION

Phytalus Resistance Experiments.

The root work carried out during the year has been concerned mostly with the correlation of root characters with practical problems. Considerable advances have been made on the basis of Phytalus resistance. In the Phytalus resistance trial at Côte d'Or Sugar Estate, Phytalus surveys undertaken by the Entomologist showed a significant difference in the number of larvæ associated with the different varieties.

The remarkable result emerged, however, that these figures were highly correlated with the silica content of the roots of these varieties.

The correlation coefficient between the two sets of figures was—0.918. Whether the obvious assumption that the number of larvæ attacking varieties the roots of which are poor in silica is always higher than the number attacking varieties with high silica, remains to be proved.

The root-systems of the varieties were examined at monthly intervals during the feeding period: the stools being then uprooted and transported to Réduit. The canes were subsequently separated from each other, the roots pruned off, and the canes placed in moist sawdust to test their recovery power as determined by new root formation. The new roots produced were derived from three sources, *(a)* ungerminated primordia in old root bands, *(b)* ungerminated primordia in younger root bands near the soil surface, and *(c)* from new underground buds and tillers.

The total number of new roots produced as a result of this root pruning treatment simulating Phytalus damage varied greatly in the different varieties, and was closely correlated with resistance to Phytalus as measured by the yield of cane produced by the end of the Phytalus feeding period, the correlation coefficient being + 0.76, a value which is fully significant at p = 0.05. It thus appears that the basis of Phytalus resistance is determined by the number of reserve primordia capable of developing into new roots under the stimulation provided by root damage.

Pot Culture and Field Experiments on Time of Application of Fertilisers.

A series of experiments was carried out on the influence of time of application of fertilisers on tillering and growth of the cane. The results may be briefly summarised as follows:

Nitrogen.—Under the conditions of this experiment an application of nitrogen at planting caused an almost immediate increase in tiller numbers and growth of the shoots: an application delayed until the plants were three months old, however, had a much greater effect on tillering than either the complete dressing at planting or a divided dressing. In so far as the first eight months of growth is concerned application of the major part of the nitrogen at 3 months was the most effective.

Potash.—Under the conditions of the experiment, the effect of potash, though not significant in the early stages, had become fully so at 6 to 8 months, causing an increase in the number of tillers, length of shoots and weight of shoots. The application at planting was the most effective.

Phosphate.—The response to phosphate, under these conditions, was much greater than the response to nitrogen or potash. The application at planting was very significantly better than any of the other times of application. A delay of even three months had a marked depressing effect on number of tillers and yield of canes. There was no advantage in dividing the phosphate dressing and applying in more than one application.

Field experiments have been laid out in six localities, to test, on a field scale, the results obtained from these pot experiments.

Method of Application of Fertilisers.

The experiments on method of applying fertilisers commenced at Rose Belle Sugar Estate were continued on ratoons. The detailed treatments are

given in the Annual Report of the Sugarcane Research Station. The yields are given below:

Treatment	Tons/acre	% of General Mean
A	23.5 ...	102
B	25.0 ...	108
C	23.5 ...	102
D	22.4 ...	97
E	21.3 ...	92
General Mean	23.2 ...	100
Sugar Estate	0.8 ...	3.5
Significant difference ...	2.48 ...	10.7

(B) yielded 1½ tons more than the next best (A) and (C), but this difference fails to reach significance. (B) is however, significantly better than (D) and (E), and (A) is almost significantly better than (E). Since the treatments (B) and (D), and (A) and (E), respectively, differ only in crowbar application, against devidage, it appears that crowbar application is considerably better than other methods of application.

Leaf Diagnosis and Injection Work.

Collaborative work with the Chemical Division has been initiated to test methods of determining nutrient deficiencies and correct balance for optimum growth. The leaf diagnosis method is being applied to the time of application of fertiliser trials, and the use of injection methods is also to be tested.

Experiments on the Disposal of Trash.

Experiments to determine the value of trash-burial, with and without fertilisers, as compared to leaving the trash on the surface of the interlines have been initiated. The treatments applied in May–June had no effect on the yields of the current crop, but may influence the yield of the next crop.

Experiments on the Chemical Control of Weeds.

Experiments have been carried out at Union Park Sugar Estate, in collaboration with the Plant Pathologist on the control of the grass locally known as "Mackay." Sodium chlorate, and various proprietary products were tried. Sodium chlorate proved to be the most toxic to this grass. One proprietary product was later tried, which appeared in preliminary experiments to be as efficient, if not more so, than Sodium chlorate. This substance is being tested further. The economic rate of application was 1 oz. per square yard, and it was much more effective to apply the chemical in solution than to sprinkle it in the dry state, even when the application was followed by rainy weather.

The investigation of the effect of weather conditions showed that it was necessary for the chemicals to penetrate quickly to all, or most, of the roots. Immediate burning effects as well as later toxic effects following absorption were noted.

Under favourable conditions, a complte control of "Mackay" was effected while under unfavourable conditions when the grass was not completely killed, it was so seriously damaged that it remained stunted, and flowering was inhibited.

The cost of eradicating the grass by chemical means would be considerably less than by cultivation, at the current price of these weed killers.

Miscellaneous Investigations.

Water-loss and Drought Resistance in Sugarcane.

Marked differences in the rate of water-loss from sugarcane leaves were established. From the data available, it appears that those varieties most favourably placed from the point of view of root absorption are also the most favourably placed from the point of view of water loss. The method of determining drought resistance by the root-pruning technique described previously is satisfactory in that all the factors involved play a part. Determinations on a large number of varieties including the varieties bred in recent years, indicate that there are no local varieties which are appreciably better than B.H.10(12) in their capacity for drought resistance.

Hormone Experiments.

Hormones caused a marked acceleration in the rooting of cuttings, the effect being considerably greater when canes with attached leaves were allowed to absorb the solution before cuttings were taken than when prepared cuttings were allowed to stand in the solution. An experiment on a field scale, however, failed to show any yield increment as a result of the hormone treatment.

Early Fertiliser Requirements of Sugarcane.

Incorporation of complete fertiliser in the cutting had a very marked effect on early growth and tillering. From the results it is considered advisable to determine the economic value of the practice of pre-fertilisation of canes from which cuttings are to be taken. Such experiments have been recently carried out in Cuba, where increases in yield of up to 47% were obtained on poor soils.

Botanical Investigations of Cane Varieties.

A botanical analysis of all the new seedling varieties released in Mauritius since 1930, and also of the varieties imported into the island within recent years has been completed. This botanical description including bud and leaf sheath hair groups is awaiting a section on their agricultural characteristics before publication.

H. EVANS,
Botanist.

AGRICULTURAL DIVISION

1.—Central Experimental Station, Réduit.

A larger area was planted with promising new sugarcane varieties, in order to obtain abundant supplies of planting material for distribution to estates and planters.

24,840 cane cuttings were sold for Rs. 407.20 cs. and 4,480 were distributed free to Co-operative Credit Societies for propagation. Forty tons of canes not required for planting were sold to Trianon Estate.

The following cane varieties raised by the Sugar Research Station were planted, viz.—M.171/30; M.72/31; M.73/31; M.134/32; M.211/33 and M.213/33.

A field was planted with Smooth Cayenne pineapples, so as to enable spraying experiments to be carried out with insecticides to control the damage done to plantations by the Mealy bug (*Pseudococcus brevipes*), which is the principal pest of pineapples in the Colony. Results which have been obtained so far are encouraging, and it is hoped that in future it will be possible to keep this pest in check.

Regulations are now in force compelling all persons to disinfect pineapple planting material before selling them to the public.

61,600 pineapple plants were sold for Rs. 308. The fruits were sent to the Mauritius Pine Apple Canning Cy.

The Experimental plots of (Chaulmoogra) *Hydnocarpus Wightiana*, Blume; (Carob) *Ceratonia siliqua*, Linn; (Cloves) *Eugenia caryophyllata*, Linn; (Coffee) *Coffea excelsa*, Cheval, are now well established.

A fair crop of "Tuba" root was harvested in the *Derris elliptica*, Benth plantation made in 1936. Samples of the roots have been prepared for sending to the Imperial Institute for a report as to their insecticidal value (etc.).

New land has been cleared and planted with various food crops. Plants and seeds were sent in exchange to the following Agricultural and Botanical Institutions and persons:

Director of Agriculture, Zanzibar.
Director East African Research Station, Tanganyika.
Government Botanist, British Guiana.
Pathologist, Bureau of Plant Industry, U.S.A.
Director, Botanic Station, Egypt.
Director, Coconut Grove Palmetum, U.S.A.
Director Horticultural Section, Ministry of Agriculture, Egypt.
The Manager, Government Botanic Gardens, Crimea, U.S.S.R.
Mr. N. Champagne, Canada.
Mr. J. Paulhus, Canada.

The main drive was thoroughly repaired with tarmac.

2.—Barkly Experiment Station.

An increasing number of members of the public visited this Station during the year, some to obtain information and others to buy fruit or ornamental plants, from the large stocks available for sale in the Nursery.

The revenue amounted to Rs. 1,542.15 as compared with Rs. 1,508.40 in the previous year.

Plantations of maize, sweet potatoes, manioc, yams, tannias, ground nuts, etc., were made in order to supply planting material to allotments, School Gardens, etc.

It was possible, through the courtesy of the Director Botanic Gardens, Kew, and the help of the Assistant Agricultural Officer who was on leave in England, to introduce with success the following kinds of willows:

Salix triandra, Black Maul.
,, Vitellina, Golden Willow.
.. hybrid, Long Ashton, 31.
,, hybrid, Long Ashton, 29.
.. Viminalis, Long skin.
.. sp. Madeira.

The Willows will be planted and propagated in suitable localities and it is hoped later on to provide strong durable material for making light furniture and baskets ; these are at present made from a species of Honeysuckle and are of inferior quality.

Plants and seeds were received from the following Agricultural and Botanical Institutions and persons:

Government Botanist, British Guiana.
Secretary, Agricultural and Horticultural Society of India.
Assistant Director, Bureau of Sugar Experiment Station, Brisbane Australia.
Director, Royal Botanic Gardens, Kew.
Conservator of Forests, Palestine.
Director, Agricultural Research Station, Tanganyika.
Director, Middle Egypt Botanic Station.
Adviser on Agriculture, Federated Malay States.
R. H. Montgomery, Coconut Grove Palmetum, Florida, U.S.A.
W. R. Holloway, North Queensland, Australia.

3.—Royal Botanical Gardens, Pamplemousses.

Economic Station.—The following sugar cane varieties were propagated in the varietal plots.—M.171/30 ; M.72/31 ; M.73/31 ; and M.134/32.

23,960 cane cuttings were sold for Rs. 479.20 and 867 distributed free to the Co-operative Credit Societies.

Canes not required for propagation were sent to " Beau Plan " and " Belle Vue " factories.

34,323 cane cuttings were received from the Sugarcane Research Station and were distributed as follows.—33,793 sold to planters for Rs. 675.86 and 530 given to the Co-operative Credit Societies.

The experimental plantation of Vanilla made in 1935 flowered abundantly, a fair number of flowers were fertilized and a good crop of pods will be reaped next year. It was necessary to shelter the vanilla vines with dry palm leaves during the abnormal period of drought, as the *Jatropha curcas*, Linn. (Physic nut tree) used as support had shed their leaves.

Several pepper vines flowered and fruited, but on the whole progress was slow as the plants do not appear to be acclimatized.

The usual food crops were planted ; seeds, cuttings and tubers were distributed free to all persons applying for them.

345 mango grafts and 232 litchi layers were made and forwarded to Abercrombie Nursery and Barkly Experiment Station for sale to the public.

The litchi crop was sold by public auction for Rs. 500 as compared with Rs. 40 for 1937.

Ornamental Section.—The rectangular pond in the gardens was drained and cleaned. A masonry stone wall was built along the banks to stop erosia ; *Hyophorbe Verschaffeltu* palms were then planted parallel to the borders. It is intended to establish a collection of Victoria regia, Lindl. ; Nymphaea (water lilies), Nelumbo (Lotus) and other ornamental plants in this pond as an additional attractive beauty spot for visitors.

All kiosks, bridges, canals, and railings were kept in good condition. Coral sand was spread along the avenues leading to " Mon Plaisir " house.

The quarters and storerooms were repaired and the gates painted by the Public Works Department.

The rainfall for the year was 46.19 inches.

4.—Abercrombie Nursery.

Many plants were raised in this nursery for sale to the public. The following plants were sold. 155 mango grafts, 90 litchi layers, 132 citrus grafts and seedlings, 1,195 ornamental plants, 439 miscellaneous.

The revenue for the sale of plants amounted to Rs. 722.05, an increase of Rs. 172.40 compared to the previous year.

5.—Government House Grounds.

The grounds of Government House, Port Louis, were kept clean throughout the year.

Le Réduit grounds were maintained in good condition.

6.—Food Settlements St. Martin and La Ferme.

These food settlements were regularly visited by officers of the Agricultural Division in order to give necessary advice and guidance to the plot holders who are all members of the local Co-operative Credit Society.

7.—School Gardens and Agricultural Instruction.

The lay-out and upkeep of the majority of the thirty-two registered School gardens continued to be satisfactory ; they are often inspected by Agricultural Instructors and the Assistant Agricultural Officer when demonstrations and short lectures are delivered to the pupils.

Prizes were awarded to the best kept gardens as follows:

1st prize of Rs. 40 to Plaine des Papayes Government School.
2nd ,, ,, 30 to Old Grand Port R.C. Aided School.
3rd ,, ,, 25 to Ruisseau Rose Government School.
4th ,, ,, 20 to Escalier Government School.

Two prizes of Rs. 12.50 each to Poudre d'Or and Chemin Grenier Government Schools.

One prize of Rs. 10 to Mahebourg Government School.

Ten prizes of Rs. 5 each to the following gardens:

Crêve Cœur Government School.
Camp Diable Government School.
Rivière des Anguilles Government School.
Bois Chéri Government School.
Marc d'Albert Government School.
Rose Belle Government School.
Highland Road C. of E. Aided School.
Souillac Government School.
Bambous Government School.
Clairfond C. of E. Aided School.

8.—Visits to Estates and Planters.

The Senior Agricultural Officer who acted for the Director during his absence on leave paid sixty seven visits to Estates in order to keep in close touch with the planting community ; he also accompanied Lord Dufferin, the Under Secretary of State for the Colonies and H. E. The Governor on a visit to Trianon Estate.

The Agronomist who was also acting S.A.O. for six months carried out experiments on estates and paid 73 visits of inspection. The Agricultural Instructors were in close touch with the small planters throughout the year.

9.—College of Agriculture.

The usual number of lectures were delivered to students of the Agricultural College.

10.—Export of Litchis.

The export of fresh litchis to London continues to interest several local firms ; the following number of cases were exported towards the end of the year:

Messrs. Pearmain & Co. shipped 650 cases by S.S.Bontekoe and Warwick Castle in December ; they arrived in good condition but unfortunately the market which had been from 1 /3 to 1/6 per pound dropped to about 1/- on account of consignments of South African Fruit.

A trial shipment of 50 cases to Cape Town was also successful.

Messrs. Merven & Co. exported 4,000 cases by S.S. " Tegelberg " and " Ruys " ; from the latest information received this consignment was a success, but this also was sold when the sale price had droppped to 1/- per pound. This shipment was made on a commission basis at the request of a South African firm.

Messrs. Moreea & Co. sent a small consignment of 40 cases to their London agent, but no information about this shipment has been received by this firm.

Necessary regulations will soon be introduced to protect this new interesting industry,in order to prohibit the export of inferior fruit.

11.—Allotments.

The average number of allottees on the various allotments is as follows:

Richelieu	...	24
Curepipe	...	7
Bois Marchand		32
Floréal	...	2 (up to June)
Barkly	...	49
Malherbe	...	18
Total	...	132

The two plot holders at Floréal vacated their allotments during the second half year as the land is required for building purposes, they received suitable compensation fixed by the Government Valuer.

With the exception of the Curepipe and Malherbe allotments where rain was evenly distributed throughout the year and good crops were obtained, the abnormally long period of drought did much harm to the plantations in other localities.

As in past years, the allottees received practical advice for planting crops, and free distribution of timber, thatch for huts and planting material by this Department.

12.—Pineapples.

The manurial trial laid down at the Central Experiment Station in February 1936, was harvested and the results published in Bulletin form. Its object was the testing of the effect of increasing doses of Nitrogen on the yield of Smooth Cayenne pineapples.

The actual yields and treatments were as follows:

Treatment 1—No nitrogen	...	...	...	...	11.7	tons	fruit	per acre.
,, 2—163 kil. Sulphate of Ammonia p.a.				...	13.8	,,	,,	
,, 3—238	,,	,,	,,	...	14.8	,,	,,	
,, 4—331	,,	,,	,,	...	15.0	,,	,,	

All plots received a basal treatment of phosphoric acid and potash.

Work at the three Demonstration Stations created in 1937, with the assistance of a grant of £1,000 from the Colonial Development Fund was continued and a small quantity of ' short season ' fruit was obtained in the winter. The main harvest began at the end of the year and is still in progress.

Mealy bug *(Pseudococcus brevipes)* caused much damage to the various plots, particularly at Mon Rocher. Dry conditions prevailing at the end of the year was an important yield reducing factor.

13.—Rice.

A scheme for the cultivation of rice in the Colony was prepared. The sowing began in December. The following sugar estates are co-operating viz: Alma, Yemen, St. Aubin, Colmar, Riche-en-Eau, Beau Vallon. In addition, a few small planters are also growing rice on their land. A plantation of several rice varieties has also been made at Rose Belle Estate in a field placed at the disposal of the Department. Untortunately, the prevailing dry season is proving a serious adverse factor. Cut worms were also troublesome and did much damage to the seedlings.

14.—Sugarcane Experiment.

No new trials were laid down by the Agronomist as all work relating to sugar cane experiments is now undertaken by the Sugarcane Research Station.

C. A. O'CONNOR,
Senior Agricultural Officer.

CO-OPERATIVE CREDIT SOCIETIES DIVISION

1.—Capital.

As a result of the policy adopted to the effect that the members of the existing Societies should gradually increase their shareholding it is satisfactory to note that the working capital of the Societies is now on an ascending scale.

2.—Government Loans.

No advances from State Funds were made to any Society during the year. Repayments amounting to Rs. 1,930 were effected to the Treasury by the Societies holding Government Loans. The balance due to Government now is Rs. 15,070 as compared with Rs. 17,000 on the 31st December, 1937.

3.—Reserve Fund.

The Reserve Fund of the Societies is now 2.737 times the value of the shares contributed by the members, as against 3.05 times last year. The following transactions explain this comparative decrease:

(i) expenses incurred for the maintenance of planting material and demonstration plots ;
(ii) bad debts charged to the Fund ;
(iii) increase in the share contributions.

4.—Societies Dividend and Interest.

Three new Societies were registered during the year. The number of Societies in operation in the Island on the 31st December was 37. No dividend was declared by any of the Societies. Twelve Societies reduced the rate of interest on loans to their members. The average rate of interest was 7.94%.

5.—Dissolved Societies.

Liquidation proceedings were not closed in the case of any of the dissolved Societies. As no Society was dissolved during the year under review, the number of the Societies in Liquidation, which last year stood at nine, re-

mained the same. Special attention will be directed towards hastening, if possible, liquidation proceedings in respect of some, if not of all, of the dissolved Societies.

6.—Loans to Members and Recoveries.

Of the loans issued and recoverable during the year, 0.55% only has fallen in arrears, as compared with 2.8% the previous year. The overdue debts at the close of the financial year stood at Rs. 24,288 as against Rs. 42,965 last year.

7.—General Meetings.

The Annual General Meetings of the Societies were held during the months of July and August. Owing to recent return from leave and consequent upon heavy accumulation of agricultural duties the Registrar, who is also Director of Agriculture, was able to conduct only five of these meetings. Those of the remaining Societies were conducted by the Assistant Registrar. The books of the Societies, the transcripts of current and overdue loans and other statement of accounts prepared on the occasion of the audit inspection were checked and certified by the Presidents and Secretaries. The debtors present were examined as to their financial position. Letters reviewing the affairs of each Society and advice given were sent to the President. Copies of the Balance Sheet, Profit and Loss Accounts, and a statement of Receipts and Disbursements were appended to such letters.

8.—Planting Material and Demonstration Plots.

The plots started by the Societies in the previous years are being maintained. One demonstration plot was started during the year. Thus, the Societies having either planting material or demonstration plots are now 16 in number. In the case of some of the demonstration plots, the Department of Agriculture is taking steps to supply their requirements of manure and phosphatic guano. Otherwise such plots are maintained at the Societies expense, except planting material which was supplied free of charge by the Department of Agriculture.

9.—Conclusion.

In conclusion I wish to express my gratitude to the Official Staff, firstly for the valuable assistance they have given me in the discharge of my extra responsibilities during the absence of the Registrar ; secondly, for the manner in which they have performed their arduous duties during inconvenient hours and the tact which they have displayed under occasionally difficult circumstances.

M. BURRENCHOBAY,
Assistant Registrar.

Note.—The work of these Societies forms the subject of a special annual report issued in August–September. The details of the working thereof for the financial year ended 30th June, 1938, are shown in the annexures to such report.

ANNUAL REPORT OF THE

DIVISION OF PLANT PATHOLOGY

1.—Diseases of the Sugarcane.

GUMMOSIS (*Bacterium vasculorum* (COBB.) G.SM.).

(a) Incidence.—A mild outbreak of gumming disease occurred in July on virgin S.C.12/4 on two estates of the Savanne district. These were the first observations of gumming on this variety and no other cases were reported from other localities. A more severe attack was studied on M.13/18 on an estate near Vacoas.

(b) Resistance Plot.—Border rows were inoculated with mixed suspensions of *B. vasculorum* isolated from different varieties of canes from various localities in the island. Cultures of *B. vasculorum* from *Dictyosperma album* Wendl. and *Thysanolaena maxima* O. Kuntze were also added to the suspensions. Several observations were made, but owing to the dry conditions prevailing during the latter half of the year, the seedlings will have to undergo a further period of observation.

(c) Strains of *B. vasculorum* (Cobb) G. Sm.—The cultural characteristics of 29 solations of *B. vasculorum* from different varieties of canes growing in different localities were studied. Only slight variations were recorded.

LEAF SCALD (*Bacterium albilineans* ASHBY)

With a view to devise a method to determine resistance to scald, a plot was laid out early in 1938 at the C.E.S. with different varieties. Some of the cuttings were immersed for two hours in water contaminated by the addition of disintegrated Scald affected White Tanna canes ; others were contaminated by means of an infected knife. Although several of the varieties used are susceptible to scald under field conditions, a few stools only were found to develop the disease.

SMUT (*Ustilago scitaminea* (RAB.) SYD.).

Two plots were laid out at the P.E.S. to test various methods of infection in order to determine the resistance of different varieties to the disease.

In the first plot, rows of different varieties were planted on both sides with rows of diseased stools. Only two smutted shoots were produced eight months after planting.

In the second plot, rows of different varieties were treated as follows:

(a) Watering the holes with a suspension of smut spores after the canes had sprouted.

(b) Placing a smutted shoot over the surface of the soil in the hole after the germination of the cutting.

(c) The cuttings, after a pregermination period to allow the eyes to swell, were immersed in a suspension of smut spores, and planted.

None of the methods gave promising results.

Towards the end of 1938 another plot was laid out at P.E.S. to try artificial infection in the field through the root system of the plant.

Water cultures of BH.10/12 were also started at the C.E.S. to try root infections with smut spores, and, if successful to study the life history of the organism.

A trial was laid out in one estate in the North of the Island to study the relation—if any—of smut incidence and the method of application of farmyard manure.

Red Rot (*Colletotrichum falcatum* Went).

Incidence.—It was found that in most localities of the island the two varieties Selangore seedling and M..73 31 suffered heavily from red rot. These two varieties appear to be very susceptible to the disease, particularly when planted in " grande saison ". A few cases of red rot were also recorded on M.134/32 on an estate in the Savanne district.

Resistance Plot.—In view of the importance of this disease in some localities of the Island, a plot was laid out at P.E.S. towards the end of the year to devise a suitable method to test the seedling canes produced by the Sugarcane Research Station. Preliminary experiments have given promising results, the procedure adopted being as follows: *(a)* the leaves were violently stripped off the shoot and the stems sprayed with a spore suspension; *(b)* light wounds were made with a knife on the mature portion of the stem and inoculated with cultures of the fungus. It was found that a susceptible variety, (DK.74) showed typical symptoms fifteen days later when inoculated by the second method.

Eye Spot (*Helminthosporium ocellum* Faris).

The relation—if any—between eye spot incidence and treatment with Potassic fertilizers is being studied on BH.10/12. One of the Sugarcane Research Station fertilizer trials is used for the purpose and another experimental plot was laid out on an estate in upper Grand Port.

2.—Diseases of Tobacco.

A survey of tobacco diseases was carried out from May to August and formed the subject of a special report. Advice was given to planters on the proper treatment of seed beds and nurseries and an endeavour was made to obtain as much information as possible on the occurrence and spread in nurseries and fields of the three major tobacco diseases in the Island ; namely, Black Shank, Mosaic, and Granville Wilt. As a result of this survey it was found that Black Shank was more prevalent in the Black River and Pamplemousses districts, Mosaic in Black River and Plaines Wilhems, while attacks of Granville wilt was of frequent occurrence in Flacq and Rivière du Rempart. In connection with the last-mentioned disease, a serious outbreak occurred in a plantation in Rivière du Rempart. It is interesting to record that this same field was infected with *B. solanacearum* six years ago and was thereafter allowed to bare fallow. It would thus appear that in infected areas a longer period of rest is necessary to avoid the incidence of wilt.

The enation type of mosaic was observed in one plantation in Rivière du Rempart, one in Port Louis, and two in Black River. This form of mosaic appears to be more virulent than the ordinary type.

With a view to classify and differentiate the various forms of mosaic in the island, descriptions of affected plants were made and photographs of leaves taken. So far, seven distinct types of symptoms have been recorded and it is proposed to carry out inoculation experiments next year.

In a region of Black River where mosaic appears to be particularly common a thorough search was made for weeds showing mosaic symptoms. Eight species were collected and inoculations made on healthy tobacco plants. The results were negative. Preliminary experiments carried out at Central Experiment Station indicated that apparently healthy plants of *Solanum nigrum* Linn. (Brède martin) growing in a mosaic affected field could transmit the disease to healthy tobacco plants.

3.—Diseases of Pineapple.

Wilt.

It was pointed out in the Annual Report for 1937 that, factors, other than unfavourable soil conditions, could be held responsible for pineapple wilt in the island. Experiments were therefore started early in 1938 to promote the research for possible aggressive fungi in the soil and to determine the exact relationship existing between the mealy bug *Pseudococcus brevipes* Ckll. and pineapple wilt in the island. Young apparently healthy pineapple plants (Smooth Cayenne) were disinfected in 1% Mulsulphol solution and planted in boxes with glass slides (three plants in each box). Some of the boxes were filled with soil from diseased pineapple fields, some with soil from fields which had never borne pineapple plants and others with soil autoclaved at 30 lbs. pressure for 15 min. Healthy roots were produced in the three series of boxes and normal growth ensued.

Plants in two of the boxes containing sterilized soil received on 24.1.38 a heavy infestation of *P. brevipes* removed from wilting plants. Black ants attended the bugs during the progress of the experiment. The first symptoms of wilt began to be manifested on one of the infested plants on 10.3.38 and by 11.4.38 all the infested plants were affected by wilt and slowly died out

Two boxes containing sterilized soil were brought to a diseased pineapple field at Pamplemousses and there infested with *P. brevipes*. Red ants attended the bugs and three months later all the plants were showing typical wilt symptoms. The plants in all the other boxes remained as controls, they did not develop wilt and were uprooted after a growth period of nearly one year.

The experiment was repeated in the field and proved conclusively that *Pseudococcus brevipes* is the cause of pineapple wilt in the island.

4.—Diseases of Citrus Trees.

The control of citrus " mottle leaf " is under investigation at Barkly Experiment Station. Various zinc sprays are being tried as well as injection of minute doses of zinc in the stem.

5.—Diseases of Pigeon Pea.

An outbreak of wilt occurred on pigeon pea at the Central Experiment Station in March. The diseased plants were uprooted and burnt. The causal organism was identified by the Imperial Mycological Institute as being *Fusarium moniliforme* Sheld. var. *subglutinans* Wollenw. and Reinking (perfect stage *Giberella Fujikuroi* (Saw.) Wollenw. var. *subglutinans* Edwards).

6.—Disease of "Tatamaka" (Calophyllum inophyllum Linn.).

Death of "Tatamaka" trees (*Calophyllum inophyllum* Linn.) was investigated in some of the indigenous forests. It appears that two distinct diseases are present.

In the first case the affected trees die slowly (one to two years). There are distinct lesions on the bark which extend in the wood and are continuous with affected roots. The lesions exude a brownish sticky gum. The same fungus was isolated from affected bark, wood and root but has not been identified yet.

In the second type of disease there is rapid wilting of the leaves and death ensues in a short time. No apparent lesions were seen and the bark and heart wood appeared to be healthy. On the other hand a large number of blackish brown streaks were conspicuous in the sap wood and extended in the roots. A fungus was isolated from the affected sap wood and roots but has not been identified yet.

7.—Miscellaneous Diseases.

The following diseases were first recorded in the island during the year under review:

Eriobotrya japonica Lindl. (Bibasse) Die back caused by *Corticium salmonicolor* Berk. and Br.

Stenotaphrum dimidiatum Brong. Rust *Uredo Stenotaphri* Syd.

Vangueria madagascariensis G. F. Gmel (Vavangue) Rust. *Accidium Vangueri* Cooke.

Paspalum paniculatum L. Leaf spot *Piricularia grisea* (Cooke) Sac.

Pandanus utilis Bary Leaf spot *Pestalozzia sp.*

Lyssochilus sp. Inflorescence rot *Colletotrichum gloesporioides* Penzig.

8.—Plant Diseases in Rodrigues.

The writer visited the island of Rodrigues during the month of September and studied the various diseases occurring in that island.

Special mention must be made of an apparently new disease of the coconut which was studied in some detail and will shortly form the subject of a special paper.

The symptoms can be briefly described as follows: clear cut horizontal lesions occur at various heights on the trunk and give the impression that knife cuts have been made on the tree. These cuts develop in acropetal

succession and often exude a brownish sticky gum. Evidence was gained that the disease begins in the crown part of the tree and the external symptoms are only visible a considerable period later. Although the symptoms are distinct from those of the stem bleeding disease, the fungus *Ceratostomella paradoxa* (De Seynes) Dade was isolated from diseased tissues. It may be possible that in this case the fungus is only secondary. The disease was found to occur almost in epidemic form in various plantations of the island.

9.—Weed Killers.

In collaboration with the Botanist of the Sugarcane Research Station, experiments were carried out with various weed killers to attempt the eradication of " Herbe mackaye " *(Phalaris sp.)* a noxious weed of cane fields in the wetter part of the island. It was found that Sodium chlorate at the rate of 1 oz., dissolved in 2 gallons of water and applied over an area of 1 sq. yard controlled growth to an appreciable extent. Sodium chlorate used at the same rate gave satisfactory results on paths, drives, etc., invaded by various annual and perennial weeds.

10.—Grassland Improvement.

Problems connected with grassland improvement in the island received careful attention during the year. Experiments were laid out at the Government Dairy, Curepipe, and will be started early next year at Palmar to test new species of pasture and fodder plants, the effect of artificial fertilizers on sward establishment, productivity and nutritive value.

11.—Pamplemousses Herbarium.

In collaboration with Dr. Vaughan the remnants (about 5,000 sheets) of the Herbarium at the Royal Botanic Gardens, Pamplemouses, were definitely sorted out and disposed of.

Specimens of the flora of Mauritius (indigenous and exotic), Réunion, Rodrigues and Madagascar were transferred to the Mauritius Institute Herbarium, in Port Louis. Grasses will be sent to Kew Herbarium, Ferns to the British Musuem. Unlabelled and unmounted specimens were destroyed while no decision has been arrived at yet concerning exotic material (approximately 1,500 sheets).

12.—General.

The undersigned was appointed Plant Pathologist in March and assumed duty on the 14th of April. He visited the island of Rodrigues in September. The Scientific Assistant Mr. G. Orian was in charge of the laboratory prior to the appointment and during the absence of the Plant Pathologist.

A bulletin on Pineapple Wilt was prepared in collaboration with the Entomologist and a report on " Plant Diseases and Grasslands of Rodrigues " submitted during the year.

The Plant Pathologist and his Assistant delivered five lectures a week and supervised laboratory work at the Agricultural College.

Acknowledgements are made with thanks to the Imperial Mycological Institute in the identification of specimens.

P. O. WIEHE,
Plant Pathologist.

SUGAR TECHNOLOGICAL DIVISION

1.—Visits to Factories, Investigations, etc.

The Sugar Technologist and the Assistant Sugar Technologist visited many sugar factories during the crop. Advice was given and investigations were carried out.

2.—Clarification of Cane Juice.

The experience gained in the previous years permitted the treatment of refractory juices without difficulty. A new problem has, however, cropped up through the manufacture of white sugar with refractory juices ; the question was studied and it is proposed to adopt in 1939 the hot sulphitation process in one factory and a double clarification process in another factory—both factories manufacturing white sugar.

3.—The Exhaustibility of Molasses.

Researches were performed by means of a special apparatus where the temperature could be controlled, on the exhaustibility of molasses, the main object being to determine:

(1) The minimum purity obtainable with molasses of normal composition received from the factories ;

(2) The effect of concentration on the exhaustibility ;

(3) The influence of the non sugar composition on the exhaustibility.

The results of the investigations have not yet been worked out but will be published in the near future.

4.—"Controle Mutuel" and Factory Results.

Thirty-five factories forwarded their results for the fortnightly returns which were distributed as usual.

Final figures were received from the thirty-eight factories of the Colony. The results show an average sucrose content of 13.87% cane as compared with 12.99 and 13.67 in 1937 and 1936 respectively. Both the sugar output

(321,310 tons) and the sucrose content in the cane for 1938 are record figures. The high percentage of sucrose in the cane is due to favourable climatic conditions and also to a certain extent, to the increasing propagation of BH.10/12. The juice was of good quality and gave no trouble at the defecation. The purity of the molasses was, however, higher than usual.

5.—General.

The Sugar Technologist acted as Chairman of a departmental committee appointed to investigate the possibility of purchasing planters' canes by factories on a qualitative basis. The investigations involved a great deal of work. The committee held 14 meetings during the year and a sub-committee appointed to study technical questions also met many times. The Sugar Technologist spent a fortnight in South Africa where he investigated the South African methods of purchasing planters' canes on a qualitative basis.

The Assistant Sugar Technologist spent two weeks in Réunion Island and investigated the production of absolute alcohol and the use of alcohol as fuels.

Articles were written for the Revue Agricole by the Sugar Technologist and by his assistant.

6.—Education.

The usual duties in relation to teaching at the Mauritius Agricultural College were performed by the Sugar Technologist and by his assistant. The Assistant Sugar Technologist acted as examiner in Applied Mathematics for the Registration of Agricultural Chemists.

LOUIS BAISSAC,
Sugar Technologist.

ENTOMOLOGICAL DIVISION

1.—Staff.

The Division has been called upon to perform a number of additional duties with a staff which has been reduced by the departure of a number of Officers on foreign parasite work. The Assistant Entomologist, Mr. A. Moutia, left on January 28th, for Zanzibar and North Africa, in search of Phytalus parasites. The 2nd Phytalus Officer, Mr. L. P. Regnard returned from Natal at the beginning of May, and left again at the beginning of September, being engaged upon the shipment of Tachinid parasites for Phytalus. The Scientific Assistant, Mr. J. Vinson, left on December 6th for Ceylon, where he is engaged upon the preliminary work in connection with the biological control of Diatræa.

Three additional technical assistants have been engaged during the year, Mr. L. de C. Dumée in work for the Government Tobacco Board, on *Lasioderma serricorne* F.; Mr. L. Fayd'Herbe, as assistant in the Natal parasite work ; and Mr. L. Orieux in the reception of Phytalus parasites and the breeding of *Diatræa* in the laboratory. Mr. A. W. Delord continued his duties as Chief Phytalus Officer.

2.—Pests of Sugarcane.

PHYTALUS SMITHI Arr.

The outstanding event of the year has undoubtedly been the final suppression of the hand collection campaign, in respect of the 1938–39 beetle season. This will result in a saving to planters of over Rs. 50,000 annually, after making provision for the intensified biological control campaign, which is replacing the former measure. The routine check experiment at Trianon estate (cf. Ann. Rep. 1937), showed no significant difference between larval infestation following intensive hand collection, and that in the adjoining uncollected area. Full results of the experiment over three years will shortly be published.

It must not, however, be assumed that because the Phytalus problem has, to a great extent, been removed from the public eye by the abolition of hand collection, it has ceased to be of economic importance, or that it no longer occupies first place in the list of projects of this Division. The annual larval survey has been extended and intensified in certain areas, and has been shown to give a fair estimate of the degree of infestation of an estate. From this survey and from the reports of managers, there appears to be a general decrease in infestation in the lower Grand Port area, and a decrease in intensity, and acceleration of movement of infestation in the Savanne district. With this decrease is associated a continued phenomenal progress of the Javan Scoliid, *Campsomeris phalerata* Sauss. In the Moka area, where collection ceased two years ago, no tendency to increase can be noted, indeed, a lessening intensity was the keynote of the survey. In Flacq, the position is still serious, and one factory reports a shortage of 12,000 tons of cane, of which 9,000 tons are ascribed to Phytalus, which has swept rapidly across the area. In Northern districts, the general decrease noted in former years, continues with sporadic out-breaks covering a few acres, and of a transitory nature.

To the list of established parasites of the larvæ, of which *Campsomeris phalerata* Sauss. is by far the most important, must be added *Scolia carnifex* Sauss., which was recovered repeatedly in March 1938 at Olivia Estate. This species was imported from Madagascar in 1935. Distribution of *C. phalerata* was continued by the Chief Phytalus Officer intensively, over 17,000 female wasps were released in 50 colonies, throughout the infested areas. No trace of the establishment of any of the Tachinid parasites recently imported, has yet been found.

With regard to foreign parasite work, it is impossible, in the short space available, to describe the difficulties, and the amount of work which accompany these investigations. The meagre figures of parasites shipped in no way reflect the sagacity and initiative of the officers concerned. In Natal, it has been decided to concentrate upon the mass shipment of the two parasites of *Hypopholis somneri* from the wattle areas, namely *Adapsilia latipennis* Wlk. (Ortalidæ) and *Pexopsis pyrrhaspis* Villen. (Tachinidæ). The Ortalid appears early in the flight season of the beetle, in November, and is shipped to Mauritius in the pupal stage, which occupies more than two months. It is thus difficult to rear in conditions of optimum temperature and humidity, and is, in addition, heavily hyperparasitised by two species of Chalcids.

A total of 9,500 puparia of *Adapsilia* have been received, but only two flies have so far emerged and the life history is obviously being affected by the changed climatic conditions. From January to March 1938, 4,000 puparia of *Pexopsis* were received, but owing to the short pupal period, there was great mortality en route, and only 792 flies were available for release. Special attention is being paid to the method of packing this Tachinid, so that the adult flies may survive after emergence. A third, rarer species of Tachinid, probably an *Hamavia* sp. has been found during the current season's work. The project of shipping a parasite of a large Heteronychus (Dyn.) larva from the Umfolosi flats, Zululand, which has been identified as *Microphthalma europaea* Egger (*disjuncta* Wied.), was abandoned, on account of the inability of the young parasite larvæ to develop in material which had been dug and transported in tins. It is intended to prosecute the work in the Cape Province, when the Tachinid season in Natal comes to an end.

In Zanzibar, a thorough survey of white grub conditions was made by the Assistant Entomologist. The typical Clove chafer, the Sericine, *Idæcamenta eugenia* Arr. is too small to be of much interest, but two less common species occurring in the coastal belt of small diverse cultivation, *Entyposis impressa* Koble, and *Schizonycha usambræ* Brenske, were found to be parasitised to the extent of about 1.5% by *Pexopis pyrrhaspis*, and to a less extent by an Ortalid fly. The larvae were attacked by *Microphthalma europaea* Egg. but only .53% parasitism was recorded in April 1938. Since the chief object of this mission was the shipment of North African parasites, Mr. Moutia proceeded thither in May and after several months of arduous search, succeeded in locating a very promising Dexiid, *Dexiomorpha picta Meig.*, parasitising *Rhizotrogus serraticolis* Luc. (carduorum L.) in French Morocco (Zærs Forest). Using the method of packing the parasitised larvæ singly in small tins with well rotted wood as medium, and by storing the tins at fruit room temperature en voyage (40°–45° F.) over 50% survival is obtained. After arrival, the parasite larvæ develop within 8 days, at a mean temperature of about 65° F., and the puparia yield flies after 19 days, in October, which period is reduced to 9 days in summer (January, 70° F.). Owing to the small numbers of larvæ (under 250) obtained up to the present, and to their irregular production of adult parasites, only 39 flies have been liberated. Attempts to make the flies mature in captivity, with the object of artificial rearing on Phytalus larvæ, have met with the failure usual in work on white grub Tachinids. A successful technique of artificial inoculation of Rhizotrogus larvæ with larvæ of Dexiomorpha has been devised by Mr. Moutia, and will be used for the multiplication of field collected material.

The Giant Toad, *Bufo marinus* L. was imported from Puerto Rico; 113 specimens arriving in excellent condition, without mortality, on 30th January, 1938. They were kept in a special quarantine greenhouse until August, when, after satisfactory examinations of blood smears and intestinal contents by the Government Pathologist, they were quartered in an open air pond at Barkly Experiment Station. In December, on the recommendation of the Phytalus Advisory Committee, liberation of both large toads, and of their progeny was begun and satisfactory progress is being made.

The problem of providing adequate food plants for the parasites in the canefields is receiving constant attention. It is now becoming generally the

practice to eradicate *Cordia* (Herbe Condé) and to substitute *Stachytarpheta indica*, which is equally good as an attractant to the wasps, and, since it is an early and temporary colonist in the natural succession from bare untilled ground to scrub, it cannot invade the canefields to any extent and is easily disposed of when necessary. The Javan shrub *Eupatorium pallescens* is flourishing in the Flacq district, where it attracts Scoliids in hundreds. 200 plants and 3,300 cuttings of this plant have been distributed to estate managers. It is a soft-wooded species which has no tendency to invade the fields. In the search for varieties of cane which show economic resistance to heavy infestations of Phytalus, close collaboration was maintained with the Sugarcane Research Station. A renewed attempt was made to place an extensive variety trial on ground which would remain sufficiently infested in the following larval season to produce a reasonably uniform effect on the varieties. Yield figures showed that 73/31, 72/31 and 108/30 were significantly better than the other varieties under conditions obtaining at Côte d'Or. The larval survey in these plots was carried out three times, in April, May, and early July, at the adequate rate of 60 samples of 30 sq ft. per acre. From the figures it appeared that 73/31, P.O.J.2878, and P.O.J.2727 were significantly less infested than the other canes in the trial. Whether this is due to a preference of the beetles for the foliage of certain canes, resulting in increased oviposition beneath such stools, or a differential mortality rate of larvæ feeding on roots of different chemical composition, we cannot be certain. The mean infestation figures for the three surveys, were 11,000, 12,700, and 14,300 larvæ per acre respectively, which are not sufficiently high as to produce the visible results over and above the normal varietal variation, so necessary to render such results unequivocal as evidence of Phytalus resistance. The experiment has, however, yielded a large amount of suggestive data, a full study of which has been made and reported by the Botanist of the Sugarcane Research Station.

In August 1938, a further large scale trial, involving 12 replications of 13 varieties, was laid out by the Sugarcane Research Station, in close co-operation with this Division, at Colmar Estate, where a growing infestation of over 30,000 larvæ per acre had been recorded in May. It may confidently be expected that, unless parasites intervene, there will be about 50,000 larvæ per acre in 1939, and that visible effects will be produced on the canes. It must be remarked that this trial has been planted in accordance with the growing tendency on infested estates to cultivate short season canes. A quick maturing cane planted in August, suffering only one attack of Phytalus, at a period when the plant is firmly established, may yield 25 to 30 tons per acre in the following November, and produce a stronger ratoon than would otherwise be the case, to withstand the next larval onslaught.

Observations made in the course of visits to estates now favour M.27/16, P.O.J.2878, and 108/30 as varieties which will give a tolerable yield on highly infested land. The latter cane has been found useful in extreme cases where its low sugar content is counterbalanced by its ability to give high tonnage. M.14/26 has been observed to give good yields in the infested Flacq district, and D1135 in petite saison in the upper parts of the Plaines Wilhems district.

(ii) Sugarcane Moth Borers.

The degree of infestation by these insects remains nearly constant, though the abnormally dry period from August to November caused severe local losses

in the Northern districts, and on one estate a loss of 50% of the crop over 50 acres of virgin canes was recorded. Most of this damage is caused by *Diatræa mauriciella* Wlk. (*venosata* Wlk. *striatalis* Sn.). No method of assessment of the damage to young canes by *Sesamia vuteria* has yet been evaluated, but it is hoped to obtain some indication of this by means of monthly deadheart counts in the large scale Phytalus variety trial at Colmar Estate.

The routine examination of 200 canes of each of the varieties BH.10/12, and where possible, of White Tanna, was carried out at 26 factories, from August to September, with the following results:

Variety	1937			1938	
	% stalks	% joints		% stalks	% joints
White Tanna ...	24.1.	9.5	...	20.2	8.1
BH.10/12 ...	25.1.	9.6	...	23.3	8.7.

This appears to indicate that the intrinsic susceptibility of BH.10/12 to borer attack is not significantly greater than that of Tanna, which observation was confirmed by a daily borer count at Trianon factory over a period of 50 working days. The general belief to the contrary is perhaps due to the fact that BH.10, 12 is more commonly found in the drier districts than Tanna and that borer attacks is always more severe in such areas.

During the year, the scheme of biological control measures devised by the Entomologist was approved as a basis for a grant from the Colonial Development Fund over a period of three years. The initial project is a search in Ceylon, the original source of the Mauritius borers, for parasites of the larva of *Diatræa* both in canes and in wild host grasses. Mr. J. Vinson left Mauritius in December 1938, to undertake the preliminary survey, which is to be extended to India in due course. It is hoped to attempt the shipment of the egg parasite, *Phanurus beneficiens* Zehnt. from East Java during 1939. Steps have also been taken to obtain material of the West Indian Tachinids, *Luxophaga diatræa* Tns., *Paratheresia claripalpis* v.d. Wulp., and *Metagonistylum minense* Tns., through the medium of Farnham House Laboratory. The possibilities of initiating a search for stalk borers and their parasites in New Guinea, the home of abundant and diverse species of *Saccharum*, are being explored.

In Mauritius, the commonest larval parasite is the Braconid, *Apanteles flavipes* Cam. which has been found in up to 50% of the Diatræa material collected in various infested fields during November and December. In one case, 109 parasites emerged from one living larva which pupated successfully. Not a single specimen of *Henicospilus antankarus* Sauss. has been obtained from more than 300 borer larvæ bred to maturity. It has been found possible to collect small numbers of egg masses of Diatræa on the leaves of cane, the number of eggs per mass varying between 19 and 45, with a mean of 30, none of which were parasitised by *Trichogramma*. In connection with the latter insect, the presence of its laboratory host, *Sitotroga cerealella* in Mauritius has been confirmed during the year, so that no difficulties in the inception of artificial rearing of the parasite will arise, should this step be decided.

(iii) *Pseudococcus sacchari* CKLL.

This insect is found universally in the canefields, and in dry seasons, it has been known to hasten the death of shoots by its rapid multiplication under

the leaf sheaths. There have been two cases during the year of damage to young sprouting cane shoots, but this effect was found to be secondary to a heavy infection of the seed pieces with Pineapple disease.

(iv) *Aulacaspis tegalensis* ZEHNT.

An outbreak of this white encrusting scale occurred in June 1938, on maturing canes, over an area of about 10 acres of Selangor Seedling at St. André estate in Pamplemousses district. A field of young canes immediately adjacent was quite uninfected. Early reaping with previous burning of the trash was recommended. A similar, though less extensive outbreak was observed in Black River district, 1½ miles from Pointe aux Sables, but in this case many thousands of the larvæ of the Coccinellids, *Lindorus lophanthæ* Blaisd. and the Javan *Chilocorus politus* Muls. were present, the latter only 18 months after its first release on coconut palms at Pointe aux Sables.

(v) *Marasmia* (*trapezalis* GN.).

In May 1938, this leaf roller was present in many districts in the island, and on one estate (Union Park), nearly 100% of the young shoots in ratoon cane were seriously affected. The larva fastens together the edges of the leaftips in such a way as to inhibit the growth of the central shoot, which becomes chlorotic and frequently dies. A deadheart is thus formed, which at first sight might be taken for borer damage; in other cases, an effect similar to that produced by Pokka Bong is produced. It is difficult to suggest control measures for such a pest, but it is almost certain that damage will be confined to those regions where growth is temporarily slowed down, either by cold, as in the above case, or by drought as on some coastal estates. At the end of the attack a Braconid parasite appeared in fair numbers.

3.—Pests of Pineapple.

(i) *Pseudococcus brevipes* CKLL.

The cause of wilt disease of pineapple having been established by infection experiments carried out in co-operation with the Plant Pathological Division, as being a toxic effect of mealy-bug feeding, every effort has been made to develop efficacious and economic sprays for routine use on plantations. Full details of these studies have been presented in a Departmental Bulletin "Pineapple Wilt in Mauritius" by W. F. Jepson and P. O. Wiehé, and it shall suffice to say here that the control measure recommended is regular high pressure spraying with 1% crude Diesel Oil, emulsified on a colloidal clay of local origin. Natural enemies of the mealybug are the Coccinellid *Scymnus mauritiusi* Korschf. and a Cecidomyid fly, whose larvæ are predaceous, but their effect is generally negligible. A shipment of *Cryptolæmus montrouzieri* Muls. has been received in excellent condition from Natal, although the chances of biological control of this pest are thought to be remote, in view of its concealed habits, and of its remarkable reproductive rate at the onset of the summer season.

The problem of the diversity of species of Pseudococcus found on diseased pineapples is being investigated by Mr. R. Mamet of this Department.

(ii) *Diaspis bromeliæ* KERN.

This scale, which was prominent in December, 1937, had been reduced to negligible proportions at the end of the summer, largely through the agency of a Chalcid parasite. The Javan predator *Chilocorus politus* Muls. attacked it readily and has become established on Trianon plantation, where it was released last year.

4.—Pests of Coconut.

(i) *Aspidiotus destructor* SIGN.

Owing to the departure of Mr. A. Moutia, the biological work on this pest has been interrupted, but the breeding and liberation of *Chilocorus politus* Muls. and *Scymnus sp.* have been continued energetically. A total of 18,500 Coccinellids of these species has been liberated at all points where infestation by *Aspidiotus* exists. Recovery of *Chilocorus* in large numbers is reported from all sides, and on several occasions, single palm leaves bearing as many as 600 pupa cases of the beetle have been sent to the Division. At Pointe aux Sables, the trees appear to be more healthy than has been the case for a number of years, the yellowing of the outer leaves, characteristic of Aspidiotus attack being notably lessened. A small shipment of *Spaniopterus crucifer* Gah. was received from Java.

Associated with Aspidiotus in causing the death of coconut, is a species of *Pseudococcus*, which is fostered by ants in the very heart of the tree on the unopened leaf blades and sheaths. It is hoped that *Cryptolæmus* may be of some assistance in reducing this pest.

5.—Pests of Stored Tobacco.

(i) *Lasioderma serricorne* F.

With the whole-hearted co operation of the Government Tobacco Officer, a vigorous policy of fumigation with hydrocyanic acid was pursued, in those parts of the bale stores where the structure of the building permitted the operation. Treatment with 2 lbs. of Cyanogas G. Granules per 1,000 cubic feet, has been effective in preventing any tendency of the beetle to attain the serious position revealed in 1937. It has, however, been necessary to fumigate the same store twice, and in one case three times during the period of 15 months, and it is now proposed to reduce the cost of fumigation by resorting to the pot method which it is hoped will be also more effective, in that a quicker evolution of gas will be obtained. In conjunction with this measure, the dusting of all stores with Kenya Pyrethrum powder has been carried out each week.

In order to acquire an intimate knowledge of the habits of the beetle, a mass of biological observations have been made in the Warehouse and in the laboratory by Mr. L. Dumée. A progress report on Lasioderma has been submitted to the Government Tobacco Board, embodying the preliminary results of these studies. Briefly, there are four or five generations of beetles annually, the largest of which develops in late summer, and flies in the early winter months(April to June). In experiments, the progeny of one pair of beetles after 4 months, in the absence of natural controlling factors, amounted to over 2,000, whereas the number of beetles and larvæ in badly infested bales do not normally exceed 500. It is nearly certain, therefore, that infestation may result from a chance oviposition by one beetle in a bale un-

less early and stringent measures are taken to arrest the development of new generations. In the existing stores, whose doors and windows are rough openings of eighteenth century design, even the most scrupulous attention to warehouse sanitation will not prevent the ingress of beetles which also breed in a variety of stored products, such as dried fish, saffron, ginger, etc. exposed for sale in nearby shops.

The role of the predaceous Clerid, *Thaneroclerus buqueti* Lef. has been shown to be of great importance in the economy of the beetle, although, like many predators, it is normally unable to exert its full action until economic damage has already been done to the product. The life cycle of this Clerid is profoundly affected by temperature; latest results indicate that there are three generations annually: a winter generation of seven months duration, culminating in a large flight in November, the time of minimal beetle emergence, and two summer generations, each of about 2½ months in length. The number of individuals consumed by the developing larvæ may be over 200 for the longer, and 40 to 60 in the shorter generation. It would appear worth while to import this species into countries where it does not already occur. In Mauritius, attempts are being made to rear the beetle in a specially constructed cabinet, at constant temperature and humidity, for timed release into infested stores.

6.—Pests of Forest Products.

(i) *Termites.*

The extent of the damage by these insects to the wooden structure of buildings cannot be estimated with accuracy, but it is the opinion of the Director of Public Works that the life of the smaller domestic dwelling in the country, constructed of eucalyptus scantlings, covered with Dipterocarp boards, or petrol casewood, does not exceed 15 years. Replacement of wood by ferro-concrete in Government construction is proceeding apace, but termites remain a source of constant expense. The species concerned are chiefly the dry wood termite, *Cryptotermes pallidus* Ramb. and the subterranean termites, *Nasutitermes vœltzkowi* Wasm. and *Heterotermes philippinensis* Light. The latter is particularly rapid in its action, and may destroy books and pictures within a few days of obtaining access to them.

In the direct control of the subterranean termites, a remarkable commercial process has been tested during the year, and may now be recommended to house owners and Government Departments whose property is being attacked by these particular species. The Thomas Cowan process depends for its efficacy upon the discovery of the runways or the nests, into which is injected a small quantity of a pink organic powder. This substance, which appears to act as a stomach poison, is rapidly diffused through the colony by the workers, who groom the soldiers and feed them, as well as the queen. In a number of independent tests on large nests, only a few soldiers were alive 48 hours after inoculation, and all traces of life had vanished after ten days. Attempts to reproduce these results with arsenicals, derris and pyrethrum, failed completely to do so. A number of treatments involving the property of firms, individuals, as well as of Government have been followed, and in every case termite activity was completely checked. The process cannot yet be recommended for the treatment of woodwork infested by the common house termite the dry wood species *Cryptotermes pallidus* Ramb. whose colonies are small and discrete, rendering them exceedingly difficult to detect,

Considerable attention is being given to the problem of wood preservation, as a means of combating termites, and close co operation is being maintained with the Forest and Public Works Departments. The key to the utilisation of locally grown coniferous timber as telephone poles and railway sleepers lies in successful and cheap preservative methods. At the suggestion of the Director of Public Works attempts are being made to employ a heavy wood tar, obtained as a by product in the Port Louis Municipal producer gas plant and to develop a successful preservative from it. On heating this substance with twice its volume of crude Diesel oil for about six hours at a temperature not exceeding 125° C. and decanting the liquid residue from the residual pitch, the phenolic constituents pass into the oil, which possesses good penetrating and promising preservative qualities, combined with the virtue of comparative cheapness. Termite exposure tests are in progress, with pine poles treated by heating for two hours in the preservative to 125°C. followed by cooling for four hours in the same solution. After six months, controls have already been attacked by *Nasutitermes*, whilst treated pieces are intact. It is now the practice to treat all fencing posts used in the Department in this manner. Tests with telephone poles have been initiated in co operation with the Forest Department.

7.—Pests of Fruits and Minor Crops.

(i) *Icerya seychellarum* Westw.

This scale is especially noxious in dry seasons, and to young plants of litchi, mango, and citrus. In several cases, control has been secured by spraying the older foliage thoroughly with a 2% emulsion of crude Diesel oil, care being taken not to scorch the youngest leaves by covering them with the liquid. If trees can be constantly banded against ants, complete control by *Rhodolia chermesina* can be obtained. A further shipment of *Vedalia cardinalis* was kindly sent by Mr. Joubert, of Stellenbosch, and three generations have been reared successfully, more than 1,000 beetles being released in the field. A small shipment was dispatched to the Seychelles, from whence it is reported that successful rearing is in progress.

(ii) *Pseudococcus* Spp.

Citrus growing in Mauritius has declined to negligible proportions in Mauritius due chiefly to the ingress of mealy bugs and scales, and it is hoped that *Cryptolæmus montrouzieri* will help to redress the biological balance in this respect.

(ii) *Crambus emmerezullus* de Joan.

Numerous reports of damage to turf by this species were reported from April to July 1938. On small areas, such as golf greens and tennis courts, prevention of attack by spraying with 2 per mille lead arsenate each fortnight from April 1st, is better than cure, which may be brought about, either by the above treatment, or more quickly by a thorough watering with a suspension of Kenya Pyrethrum powder at the rate of 5 grams per litre of water. Regular doses of Ammonium sulphate during the late growing season will stiffen the resistance of the turf to attack.

8.—Insecticides Tested and Recommended.

(i) *Derris.*

A small experimental plantation of this valuable insecticide has recently been harvested at Réduit, and whilst the rotenone content of the roots was not high (3.6%), the product is thought to be marketable. A trial shipment of 150 lbs. of the dried root has been sent to England. The yield per acre, under unfavourable conditions, amounted to 750 kgs. dry root. Experiments with the ground root have shown it to be highly toxic to adults of *Lasioderma*, *Bruchus spp.*, *Brontispa limbata*, suspensions in water at the rate of 5 grams per litre successfully controlled *Aphis tavaresi* on citrus plants. Derris is of no value in the control of cutworms (Noctuid or Crambine larvæ), but has proved useful as an insect powder for domestic animals and birds.

(ii) *Pyrethrum.*

Kenya Pyrethrum powder, (0.73% Pyrethrin I), has been tried with success against the lawn cutworm, in the form of suspension at the rate of 5 grams per litre of water. It is a most useful general contact insecticide, and may be obtained at Rs. 0.75 per lb. from the Government Tobacco Warehouse.

(iii) *Lead arsenate.*

The best form of this useful stomach poison, which has been employed successfully against tobacco worm, *Prodenia litura*, *Cratopus spp.* on hibiscus, *Adoretus* on rose, and *Crambus* on lawns, is Cooper's Arsinette, a fine powder, which also contains a spreader, and which sells for Rs. 1.75 per lb.

(iv) *Nicotine-soap.*

Tobacco waste, obtainable from cigarette manufacturers, is soaked for 36 hours at the rate of ½ kg. per gallon of water, 25 grams of soap, previously dissolved, are added after straining. The resulting solution is a simple and efficient spray against *Aphis* on rose and citrus, and has given good results against a number of scale insects.

(v) *Diesel Oil Emulsion.*

At 2% strength, this is a cheap general purpose spray against hard and soft scales, and may be used to flood the nests of the red ant, *Solenopsis geminata* F. on lawns, provided that the grass is watered immediately after application. The constant use of this spray at Barkly Experiment Station has almost eradicated the numerous scale insects which formerly infested the nursery. The concentrated emulsion may be obtained in any quantity on application to the Department, at 35cs. per gallon, to be diluted 1 part in 25 parts of water for use.

(vi) *Paradichlorobenzene.*

A mixture of Derris powder 200 grams, Pyrethrum powder 100 grams, powdered Paradichlorobenzene 40 grams mixed with seed rice at the rate of 10 grams per kilo was sufficient to prevent insect infestation, and had no deleterious effect upon germination.

9.—Miscellaneous Pests.

Pest	Host	Locality	Month	Remarks
(i) *Coleoptera.*				
Glaucytes sp. ...	Tatamaka	Bel Ombre	Feb.	Timber borer
Opatrum crenatum (Ten.)	Sugar cane	Mon Songe	Dec.	.....
Petalanobium auratum Pic. (Anob.)	Eugenia glomerata (Bois Pomme)	Vacoas	Nov.	House Timbers
Sinoxylon cornigerum Gerst. (Bostr.)	Cassia siamea	Signal Mt.	Oct.	Stem borer
Stromatium barbatum (Cer.)	Casuarina timber.	Coastal areas	March	Borer in sap wood
(ii) *Lepidoptera.*				
Agrotis ypsilon (Noct.)	Pine seedlings	Curepipe	June	Arsenical bait
Argyroploce rhynchias (Eucos.) Meyr.	Cajanus	Barkly	Aug.	Stem borer
Brithys pancratii Cyr. (Noct.)	Pancratium (Lys St. Joseph)	Rose Hill	Oct.	parasitised by Sturmia inconspicua Mg.
Crambus malacellus (Pyral.)	Rice seedlings	Rose Belle	Dec.	100% destroyed
Etiella zinckenella Tr. (Pyral.)	Soya Bean	Highlands	March	.....
Lampides bœticus L. (Lyc.)	Cajanus	Barkly	Aug.	.. ...
Maruca testulalis Gey. (Pyral.)	Cajanus Phaseolus	Barkly	Aug.	pod borer
Prodenia litura F. (Noct.)	Tobacco seedlings	Pierrefonds	May	Lead arsenate sprays
Simplicia inarcualis Gn. (Noct.)	Acrostichum fern roofing	South Coast	June	feeding on dried leaves
Sitotroga cerealella 01. (Gelech.)	Seed Rice	Barkly	Sept.	Paradichlorbenzene
(iii) *Diptera.*				
Agromyza phaseoli Coq. (Agr.)	Phaseolus	Réduit	Sept.	Stem borer
Dacus emmerezi Bez. (Tryp.)	Cucurbits	Floreal	Dec.	Bait spray successful
(iv) *Orthoptera.*				
Gryllotalpa africana de B.	Gardens	Moka	June	Barium fluosilicate
(v) *Rhynchota.*				
Asterolecanium sp.	Cassia siamea	Port Louis	Feb.	Encrusting stem

10.—Publications.

" Progress of Applied Entomology in Mauritius 1933–38 ". Proceedings of the International Society of Sugar Cane Technologists 1938. By W. F. Jepson and L. A. Moutia.

" Pineapple Wilt in Mauritius " by W. F. Jepson and P. O. Wiehe. Bulletin No. 47 General Series, Department of Agriculture, Mauritius.

11.—General

Courses in Zoology and Entomology were given by the Entomologist and Mr. Vinson in the Mauritius Agricultural College.

Mr. A. W. Delord acted as Plant Inspector at the port, twice weekly.

The Entomologist acted as examiner for the Registration of Agricultural Chemists.

12.—Acknowledgments.

I wish to make a further grateful acknowledgment of the assistance received from Dr. W. R. Thompson, F.R.S., in the shipment of *Phytalus* parasites from Farnham House ; from Mr. S. Joubert in the sending of *Vedalia cardinalis* from Stellenbosch , from Mr. Le Roux of Mueden, Natal, in the shipment of *Cryptolæmus* ; and from Dr. P. Van der Goot of Java in the collection and shipment of predators and parasites of *Aspidiotus*. I wish also to thank Dr. Walter Carter of Hawaii for valuable advice on the subject of pineapple wilt control.

W. F. JEPSON,
Entomologist.

CHEMICAL DIVISION

(A) INVESTIGATION WORK

1.—Tobacco.

The main line of research during the year under review was the investigation connected with the elucidation of the problem concerning the objectionable " tang " associated with Mauritius tobacco.

The first step was to determine the influence of the organic constituents of tobacco and its possible correlation with its aroma.

(i) The variety Amarello, which has been grown here for years was selected, and the variations in the composition of the tobacco leaf produced on plantations found in various parts of the colony were determined.

The following figures were obtained:

Locality	Starch	Total Sugars	Amino nitrogen	Nicotine	Petroleum Extract	NaCl	Ash
Mapou ...	traces	4.94	0.426	1.68	4.93	2.55	16.52
Black River (G)	,,	9.00	0.332	1.43	4.84	2.96	14.70
,,	,,	9.14	0.354	1.55	4.97	3.90	17.46
Long Mountain	,,	5.95	0.348	0.98	5.28	1.68	15.45
R. du Rempart	,,	5.27	0.348	1.40	5.68	4.36	17.37
Plaines Wilhems	,,	12.11	0.408	1.08	4.70	2.65	13.70
Standard (low grade cigarette)	,,	6.49	0.335	2.05	5.63	4.11	17.42

The variations in composition are of small magnitude, on the whole the sugar content is very low, the amount of Sodium Chloride present is influenced by the vicinity of the sea-coast.

(ii) Two varieties ; Amarello and Yellow Mammoth (imported recently) were planted in pots and grown under the same conditions, the sampling was performed at different period of growth but at the same time on both varieties.

The analytical figures were as follows:

Varieties		Sugars	Nicotine	NaCl
Amarello	A	... 5.66	... 1.78	... 0.51
,,	B	... 5.14	... 1.04	... 0.86
,,	C	... 3.45	... 1.26	... 0.72
Yellow Mammoth	A	... 24.16	... 0.72	... 0.37
,, ,,	B	... 12.32	... 0.73	... 0.47
,, ,,	C	... 11.19	... 1.00	... 0.48

The low percentage of sugars in the Amarello leaf is a striking feature.

(iii) The next step was to ascertain the variations in composition of new varieties grown and cured at " La Ferme " ; on some of them smoking tests had been performed.

Varieties	Nicotine	Sugars	NaCl	Remarks (smoking tests)
Pusa Hybrid 177 ...	5.47	12.72	0.51	Definite tang.
Gold Leaf ...	3.42	21.96	1.00	—
Cash I ...	3.00	23.40	0.86	—
Virginia Bright ...	2.94	21.39	0.71	Very slight tang.
Yellow Mammoth ...	2.85	20.00	0.84	No tang, mild.
White ,, ...	2.83	18.50	0.85	No tang, cool.
Pusa Hybrid 142 ...	2.84	18.06	1.00	Slight earthy tang.
Jamaica Wrapper ...	2.75	21.57	0.75	Slight tang, fairly cool.
Adcock 3	2.71	20.06	0.97	Earthy tang, rather sweet.
Western S	2.69	26.09	0.98	—
Improved Clarkvi le ...	2.60	21.98	0.80	—
Orinoco narrow le: f ...	2.39	7.18	0.86	—
Greenwood	2.20	29.95	0.81	—
Bonanza	1.91	7.67	0.87	Slight tang.
Maryland	1.88	31.04	0.93	—
Harrison Special ...	1.68	19.52	0.88	Earthy tang.

From the above it was deducted that an increase in the sugar content has a favourable influence on the flavour of the smoke, such smoke on the other hand has always an acid reaction while smoke from bad tobaccos is definitely alkaline.

Considering that the unpleasant odours associated with the alkaline smoke are probably derived from the breaking down of nitrogenous constituents of the tobacco, it was concluded that in addition to nicotine, nitrogenous organic compounds principally of the amido group such as asparagine and glutamine might play an important rôle.

Such determinations were performed on the following varieties:

Variety	Asparagine + Glutamine %
Imported leaves (good quality) ...	4.18
Cigarettes (low grade) ...	6.35
Amarello (mixed sample) ...	5.52
Yellow Mammoth	4.00
Greenwood	3.75

In the light of the above determinations the ratio: % Total Sugaars ÷ %Nicotine + (%Asparagine + %Glutamine) was calculated and the figure obtained seems to give an indication of the quality of the tobacco, this ratio was termed the *carbohydrate ratio*.

(iv) The position of the leaves on the stalk greatly influences the sugar ratio ; the average figures are as follows:

Variety: *Yellow Mammoth*	Nicotine	Asparagine + Glutamine	T. Sugars	Ratio
Top leaves ...	2.15	7.16	17.69	1.90
Middle leaves ...	1.29	4.89	22.41	3.62
Bottom leaves ...	1.33	5.70	17.98	2.55

(v) The effect of ethylene gas and acetylene gas treatment was tried and the analytical figures are given below. After the curing process, the attractive yellow colour of the gas treated leaves was obtained only with fully grown leaves *i.e.* those presenting when picked a slight yellowish tint. An experimental curing chamber was used. The treatment lasted 2–3 days, the gas concentration varied from 1 : 2,500 to 1 : 5,000, the temperature from 21 to 28° C. and the humidity was maintained at 80%.

Variety: *Cash*	Nicotine	Asparagine + Glutamine	T. Sugars	Ratio
Ethylene treatment ...	0.75	4.07	21.55	4.47
Acetylene ,, ...	0.77	4.07	21.55	4.40
Variety: *Yellow Mammoth*				
Control	0.88	4.07	24.90	5.03
Ethylene treatment ...	0.89	4.00	25.00	5.11
Variety: *Mixed*				
Control	1.94	7.40	26.28	2.81
Acetylene treatment...	1.87	7.20	27.95	3.08

(vi) The effect of bulking and its possible influence on the sugar ratio has been studied, and the following average figures obtained, sampling has been performed on several varieties:

	Nicotine	Asparagine + Glutamine	T. Sugars	Ratio
Before bulking ...	2.42	7.34	15.86	1.62
After bulking ...	2.41	7.33	14.20	1.45

There is an evident loss in the sugar content so that varieties which have a low % of sugar cannot be improved by bulking purposes.

(vii) The sugar ratio is also considerably influenced by the curing process adopted: either air cured or flue cured, this is illustrated by the results obtained on the Greenwood and Piet Relief Swazi varieties.

Variety: Greenwood	Nicotine	Asparagine + Glutamine	T. Sugars	Ratio
Air cured	1.65	4.95	13.36	2.08
Flue cured	2.20	3.75	29.95	5.03
Variety: P.R.S. (Piet Retief Swazi)				
Air cured	1.28	4.45	15.71	2.74
Flue cured	1.25	4.66	25.33	4.28

2.—Soap.

At the request of His Excellency the Governor, an investigation was undertaken to report on the prospects of a Mauritius Soap Industry ; in this connection a series of analyses was performed in order to determine the quality of local soaps.

The following figures show the average composition of locally manufactured soaps:

Origin	Water	Ash	Fatty acids	Glycerine	Free alkali	Total alkali
A1	20.6	18.5	59.1	5.13	0.68	5 76
A2	29.0	15.2	57.1	5.83	0.46	7.03
B1	34.3	16.6	56.5	3.25	0.03	6.32
B2	33.3	16.7	48.1	5.78	0.71	5.00
B3	31.4	17.6	51.1	5.66	0.68	8.65
C1	38.6	18.5	41.9	3.38	0.92	8.37
C2	52.9	13.5	33.5	4.20	0.74	10.05
BB1	34.5	13.8	61.6	—	nil	9.64
BB2	30.5	15.4	57.4	—	0.06	10.51
BB3	31.6	15.6	58.0	—	0.30	8.37
Standard (good quality imported soap) ...	24.7	18.0	65.5	1.04	0.46	9.76

On the whole the percentage of fatty acids is low if we consider that on the average a genuine soap contains 63%; the amount of glycerine present is high because the whole glycerine produced by the saponification is retained in the final product, this is due to the manufacturing process ; the water content is high and excessive in one case.

Two samples of cocoa nut oil, used locally for the manufacture of soap, were analysed ; the following figures were obtained:

	A	B	Lewkowitch figures
Sp. Gravity @ 15.5°C. ...	0.9250	0.9260	0.9259
Refraction Index @ 40°C. ...	1.4487	1.4489	1.4486—1.4492
Saponification Value ...	254.5	253.9	255—260
Iodine Value	6.35	6.35	8.0—9.0
Reichert Woolny figure ...	6.35	5.95	6.0—8.0

The Iodine Value and the Reichert-Wollny figure are lower than the standard figures given by Lewkowitch.

3.—Silage.

An experiment on the ensilage of cane tops was performed on a sugar estate of the northern district, unfortunately the " superstructure " of the silo proved to be of inadequate protection against rain and a loss of 66% occurred. However, the quality of the undamaged silage was good ; the analytical figures were as follows:

	%
Moisture	69.50
Volatile organic acids	0.19
Non-volatile organic acids ...	5.66
Amino acids	0.04
Volatile bases	0.09
Crude proteins	1.37
Ether Extract	0.27
N—free Extractives	0.18
Crude Fibre	10.30
Ash	2.92
True Proteins	1.19
Carbohyrdates	15.64

As in previous experiments with *stenotaphrum dimidiatum* and mixed grasses, the hydrolytic process causing the splitting up of the protein into the

more simple products of the amino acid type has not proceeded to a great extent.

The non-volatile acids preponderate largely in amount over the volatile organic acids which is considered to characterize a normal silage.

4.—Hydnocarpus Oil.

The final report from the Imperial Institute in connection with the sample of local oil submitted for analysis may be summarised as follows:

(i) The quality of the local oil compares favourably with the Hydnocarpus Wightianus oil which is at present employed in the treatment of leprosy.

(ii) The analytical figures fall within the ranges specified in the B.P.

(iii) The sample which could fully meet the official requirements however was the one obtained by expression carried out in the cold, and which gives the following physical constants:

	Expressed Oil	Reqiuremets of the B. Pharmacopœa
Specific gravity at 25°/25°C. ...	0.9566	... 0.950—0.960
Melting point	23.0°C.	... 20—25°C.
Specific rotation @ 20°C. ...	+57.0°C.	... +53°(min.)
Refraction Index @ 40°C. ...	1.4743	... 1.472—1.476
Acid Value	1.7	... 25.0(max.)
Saponification Value	203.6	... 198—204
Iodine Value (Wijs ½ hr.) ...	99.4	... 97—103

5.—Solubility of " Guanos phosphatés ".

The phosphatic fertilizer used on a large scale in Mauritius on sugar cane land is the so-called " guano phosphaté ".

These guanos are imported and are chiefly derived from the deposits found in Seychelles, Rodriguez, Agalega, St. Brandon, etc. They are generally sold as a friable dry powder and the colour varies from a light grey to a dark brown according to their composition. It is a well known fact that as the guano ages the phosphates pass more and more into tricalcium phosphate, in other words the younger the guano is, the greater is the solubility of the contained phosphoric acid.

The question of the relative availability of the imported guanos is important and it was tested by using weak solvents, the kind of information obtained may be seen in the following table:

Origin	Total P_2O_5	P_2O_5 dissolved by neutral ammonia citrate (A.O.A.C.) as % of total P_2O_5	P_2O_5 soluble in alkaline citrate (Joulie) % of total P_2O_5	P_2O_5 dissolved by 2% nitric acid as per cent. of total P_2O_5
1. Agaléga	29.57	... 28.9	... nil	... 74.5
2. Agaléga	25.87	... 27.6	... nil	... 58.9
3. Agaléga	24.57	... 23.2	... nil	... 63.6
4. Seychelles ...	30.80	... 41.5	... nil	... 63.3
5. ,, ...	32.00	... 17.7	... nil	... 46.2
6. Rodriguez ...	15.80	... 48.2	... nil	... 85.8
7. ,, ...	14.14	... 47.4	... nil	... 87.8
8. Assomption Island	28.20	... 36.1	... nil	... —
9. Saint Brandon ...	30.96	... 20.8	... nil	... 54.0

6.—Ammonia in Rain Water.

A systematic collection of rain water was performed at the Central Experimental Station of Réduit during the year 1936, 1937 and 1938 respectively and the free ammonia determined accordingly.

In parts per million of ammonia varies from 0.02 to 1.60. The following table gives the monthly variations:

Month	1936	1937	1938
January	–	0.04	1.00
February	–	0.12	0.14
March	–	0.02	0.28
April	–	0.40	0.60
May	0.28	0.14	0.50
June	0.50	0.50	1.60
July	0.90	0.25	0.60
August	1.60	0.25	0.50
September	0.40	0.40	1.60
October	0.75	0.80	0.17
November	0.28	0.28	0.24
December	0.14	0.50	0.50

The variations are probably due to the fact that slight rains have a higher concentration of nitrogen than long rains.

7.—Rotenone.

The results of analysis of roots from plants of ' Derris elliptica ' grown locally indicate that the rotenone content in certain cases was quite satisfactory ; on the other hand the rotenone content in other cases was not high enough to allow of the root being propagated.

8.—Milk.

The analysis of milk from the Government Dairy was carried out during the year.

The following figures may be quoted:

		Specific Gravity	Total Solids %	Fat %
January	evening	1030.2	12.79	4.1
,,	morning	1030.2	11.68	3.2
,,	evening	1028.5	12.37	4.0
,,	morning	1029.6	11.68	3.3
,,	evening	1029.9	12.34	3.8
,,	morning	1031.0	11.70	3.1
,,	evening	1029.8	12.65	4.1
,,	morning	1031.1	11.72	3.1
July	evening	1030.2	12.85	4.5
,,	morning	1030.4	11.83	3.5
,,	evening	1028.9	12.83	4.6
,,	morning	1030.4	11.83	3.5
,,	evening	1029.6	13.03	4.4
,,	morning	1032.6	11.83	3.6
October	evening	1029.4	13.24	4.5
,,	morning	1029.6	11.60	3.1
,,	evening	1029.8	12.88	4.6
,,	morning	1030.1	11.71	3.1
,,	evening	1029.6	11.65	4.7
,,	morning	1029.6	11.56	3.3

As usual the evening milk is much richer than the morning milk both in butter fat and in solids not fat.

B. ROUTINE ANALYSES

The routnie work during the year under review was as follows:

	Samples received	Estimations
Lime ...	2	2
Dipping ...	46	73
Phosphatic manure	9	12
Fumier ...	20	40
Miscellaneous	20	37

In addition to the above, and in connection with investigational work, the following determinations were performed:

	No. of samples	Estimations
Tobacco ...	133	638
Water ...	3	11
Silage ...	1	12
Soap ...	11	66
Oils ...	2	10
Derris roots	4	11
Pyrethrum powder	2	2
Wood ...	2	2
Rum ...	2	2
Feeding Stuffs	2	4
Rain water ...	12	12

C. EDUCATION

The usual duties in relation to the teaching of chemistry at the Mauritius College of Agriculture were performed by the Lecturer and Assistant Lecturer and during the absence on leave of the latter by Mr. R. Manet, the Scientific Assistant.

D. MISCELLANEOUS

Mr. E. Haddon is in charge of all the chemical work in connection with the investigation on tobacco. I wish to record my deep appreciation of the assistance I have received from him during the period under review.

R. LINCOLN,
Chemist.

TOBACCO DIVISION

The work of the division was confined to trials with single plant selections of the most promising of the varieties tested in the previous year. The object of the trials being to obtain a variety or strain with a flavour acceptable for the export market.

As in previous years the Government Tobacco Officer continued his duties as Secretary of the Tobacco Board and Manager of the Government Tobacco Warehouse, which duties occupy the greater part of his time,

A. TOBACCO STATION—LA FERME

The weather conditions were favourable during the early part of the year but during the later months drought affected the crop. The rainfall registered at the Tobacco Station is set out hereunder.

RAINFALL.

Month	1937 Inches	1937 No. of days of rainfall	1938 Inches	1938 No. of days of rainfall
January ...	5.73	14	0.09	4
February ...	10.21	17	5.27	10
March ...	8.16	13	5.66	11
April ...	0.97	4	1.22	10
May ...	5.53	9	3.12	9
June ...	0.62	4	0.54	3
July ...	1.27	8	0.68	12
August ...	0.31	8	0.67	9
September ...	0.79	9	0.08	2
October ...	0.59	4	0.28	5
November ...	1.68	3	0.08	5
December ...	0.92	9	0.75	7
	36.78	102	18.44	87

B. VARIETY TRIALS

These trials comprise two groups, viz:

(a) Flue cured.

(b) Air cured.

and each group was grown under a standard manurial treatment and seed obtained from single plants selected within the variety during the previous year was utilised.

(a) FLUE CURED.

This trial is a continuation of the trials with those varieties which appeared to be the most promising from the previous years' trials. The object being to obtain, if possible, a variety or strain with a flavour suitable for the export market. The varieties selected were:—

	S.P.S.
Jamaica Wrapper	36
Gold Leaf	18
Yellow Mammoth	25
White Mammoth	21
Bonanza	36
Virginia Bright	36
Cash	18
Narrow Leaf Orinoco	6

A total of 196 single plant selections made within eight varieties.

All the varieties were grown under a standard fertilizer treatment equivalent to an application of 400 ks. per acre of a mixture analysing 3.10.6. The mixture was made up as follows:

	Kilos	Kilos per acre		
		N.	P.	K.
Nicifos 18/18 ...	67 ...	12 ...	12 ...	—
S. of Potash ...	50 ...	— ...	— ...	24
Superphosphate ...	175 ...	— ...	28 ...	—
	292	12	40	24

The fertilizer was applied prior to planting and well mixed with the soil. Planting was done at the following distances, viz:

(a) 3 feet between the rows and 2 feet within the row.

(b) 3 feet between the rows and 2½ feet within the row.

The seed was sown during March and germination was extremely rapid, taking place in five days. Subsequent growth showed marked variation between the various strains of the varieties, certain strains growing far quicker than others in the seed bed, though this early rapid growth was not maintained in the fields. Planting in the field was carried out during late April and early May. All the varieties made good progress though the drought conditions experienced during the later stages of growth, combined with a curtailment of irrigation water, affected the plants considerably.

The type of leaf was good and, with the exception of Narrow Leaf Orinoco, all varieties cured well though difficulty was experienced due to curing several varieties at the same time, this reduced the quantity of bright leaf which would have been obtained had it been possible to cure varieties separately.

The average yield and value obtained from each variety are set out hereunder together with the average price per kilo. Circumstances did not allow of these trials to be laid out in a manner to enable the results to be examined statistically but the figures hereunder would appear to indicate the desirability of such an experiment. The yields and values obtained from each strain are not included herein though there was considerable fluctuation.

Yield Results.

Variety	Kilos per acre		Value per acre		Average value per kilo	
	3′ x 2½′	3′ x 2′	3′x 2½′	3′ x 2′	3′ x 2½′	3′ x 2′
			Rs.	Rs.	Rs.	Rs.
Virginia Bright ...	355.04 ...	390.31 ...	326.29 ...	397.58 ...	0.92 ...	1.02
White Mammoth ...	389.53 ...	445.23 ...	357.35 ...	409.23 ...	0.92 ...	0.92
Jamaica Wrapper...	418.17 ...	520.31 ...	328.42 ...	418.74 ...	0.78 ...	0.81
Gold Leaf	331.34 ...	429.17 ...	259.60 ...	346.23 ...	0.78 ...	0.81
Yellow Mammoth ...	376.73 ...	362.61 ...	389.65 ...	376.66 ...	1.03 ...	1.04
Cash	534.01 ...	330.87 ...	408.52 ...	237.29 ...	0.77 ...	0.72
Bonanza	350.38 ...	297.09 ...	318.42 ...	297.15 ...	0.91 ...	1.00
Narrow Leaf Orinoco	448.16 ...	665.04 ...	328.94 ...	478.82 ...	0.73 ...	0.72

Smoking tests have been carried out with the cured leaf from the above varieties with results similar to those obtained in the previous year: vide Annual Report 1937.

SMOKING TESTS.

Jamaica Wrapper	:	Slight earthy tang, burns well, dark ash.
Gold Leaf	:	Very slight if any tang, mild, burns freely, light ash.
Yellow Mammoth	:	Very slight tang, mild, rather sweet, burns freely, light ash.
White Mammoth	:	Slight tang, rather strong, burns freely, dark ash.
Virginia Bright	:	Slight tang, mild, burns freely, light ash.
Cash	:	Slight earthy tang, mild, unpleasant aroma, burns freely, dark ash.
Narrow Leaf Orinoco:		

The grade of leaf tested was the same for all varieties and consisted of middle leaves.

CURING EXPERIMENTS.

Experiments were carried out to test the effect of acetylene gas on the leaf, the effect was most marked and would appear to open up a new field of inquiry. The full details of the experiment and the results achieved are to be the subject of a special report.

(b) AIR CURING VARIETIES.

Trials were continued with the following varieties:

Maryland,
Western S,
Greenwood,
Improved Clarksville,

and two strains of Piet Retief Swazi, viz:

Piet Retief Swazi 149/23,
Piet Retief Swazi 149/24.

were tested for the first time.

The varieties were grown under a standard fertilizer treatment of 10N. 10P. 20K. applied at the rate of 400 kilos per acre and were planted during May and June. They suffered more from the drought conditions than the flue curing varieties and, in consequence, yields were poor.

The variety Maryland, seed of which was obtained from Réunion, is not true to type and cures badly though it possesses a superior flavour to Amarello.

The Piet Retief Swazi strains are most promising and cure well.

The other varieties, viz: Greenwood, Western S, and Improved Clarksville are very poor yielders though the variety Greenwood appears to possess a good flavour and will, therefore, be given further trials.

The yields and average values obtained were as follows:

	Yield per acre Kilos	Average value per Kg. Rs.
Maryland	383.4 ...	0.63
Piet Retief Swazi 149/23 ...	427.1 ...	0.92
,, ,, 149/24 ...	382 ...	0.92
Western S	227.8 ...	0.65
Greenwood	268 ...	0.67
Improved Clarksville ...	98 ...	0.62

GENERAL.

All buildings and irrigation canals throughout the Station were kept in good repair.

The windbreak of Eucalyptus and the hedge of "Bread and Cheese" Pithecolobium inguis—cati. Benth. made good growth and, in addition to their effectiveness as a windbreak, improve the appearance of the Station.

TOBACCO RESEARCH STATION—RICHELIEU.

During the month of November work was commenced on clearing the land at Richelieu estate for the new Tobacco Research Station. The capital expenditure for this station has been provided by a grant from the Colonial Development Fund.

GEOFFREY CORBETT,
Government Tobacco Officer.

VETERINARY DIVISION

HEAD I

A.—DISEASE CONTROL

(i) FIELD OPERATIONS.

Diseases under the control of the Veterinary Officers during the year were the following: Trypanosomiasis, Tuberculosis and Piroplasmosis.

The centres inspected were 1,774 as against 1,308 in the previous year.

TRYPANOSOMIASIS.

The following table shows the number of blood smears taken and examined during the year:

Description	Animals Bovine	Animals Equine	Blood control Goats	Blood control Dogs	Total 1938	Total 1937
Estates	12,015 ...	264 ...	...	...	12,279 ...	13,046
Rouliers	2,964 ...	57 ...	— ...	— ...	3,021 ...	1,103
Dairy Animals:						
Government ...	1,478 ...	— ...	— ...	— ...	1,478 ...	1,160
Private	616 ...	— ...	— ...	— ...	616 ...	495
Fort William Quarantine Station ...	754 ...	72 ...	390 ...	— ...	1,216 ...	331
Government Animals...	169 ...	35 ...	117 ...	117 ...	438 ...	802
Total ...	17,996 ...	428 ...	507 ...	117 ...	19,048 ...	16,937

Positive cases detected were as follows:

Parasite	Race Horse	Estate Bovine	Estate Equine	Rouliers Bovine	Rouliers Equine	Total 1938	Total 1937
T. Evansi	—	4	2	12	11	29	38
T. Vivax	1	7	—	1	—	9	27
Total	1	11	2	13	11	38	65

Two donkeys and a race horse died during treatment and one cow died before it was possible to commence treatment. The other infected bovines and equines were successfully treated and repeated blood tests subsequently effected indicated that their recovery was complete.

Tuberculosis.

Tuberculin tests on bovines were carried out as shown in the following table:

Animal	Dairy	Draught	Herd	Total 1938	Total 1937
Bulls	—	3	1	4	—
Cows	14	—	147	161	31
Heifers	4	—	12	16	1
Total	18	3	160	181	32
Positive reactions	nil	nil	19	19	2

It is gratying to note the considerable increase in the number of cows in breeding herds which were tested in 1938 as compared with 1937. It indicates that the breeders are getting more and more alive to the necessity for weeding out all undesirable individuals from their breeding stock. By subjecting the elder stock to the tuberculin test and injecting the B.C.G. vaccine to calves at birth, breeders were steadily cleaning their herds.

Unfortunately, the Bacteriological Laboratory was not in a position to prepare the vaccine during the whole year. The Stock Breeders Assocation endeavoured to import the vaccine from the neighbouring island of Réunion, but after 160 doses had been received importations had to be discontinued on account of excessive costs. Meanwhile, the newly appointed Assistant Pathologist arrived in the Colony at the close of the year ; it is expected that early in 1939 the Bacteriological Laboratory will be in a position to resume the preparation of the vaccine.

Piroplasmosis.

Two bullocks were found to be affected with red water fever during the year and after treatment with trypan blue both recovered. No case had been recorded in 1937.

(ii) Research Operations.

Seven cases of abortion on cows of the Government Dairy were recorded during the year. Unfortunately, the occurrence in each case took place overnight and the fœtus at the time it was detected had been trampled upon so badly that bacteriological examination was not possible.

B.—ANIMAL HUSBANDRY

(i) Field Operations.

The following pure bred stud animals were imported during the year: 12 bulls and 6 heifers of the Africander breed, 7 bulls and 2 heifers of the Charolais breed. One Africander bull and 6 heifers, 1 Charolais bull and the 2 heifers are reared by the Government with the object of supplying pure bred locally born bulls to Breeders in the future, while the remaining 11 Africander bulls and the 6 Charolais bulls have been delivered at half cost to those breeders on whose behalf they had been imported. These pure bred bulls are regularly controlled by the Veterinary Division who ascertain that they are in good health condition, are being properly housed, fed and bred, that they are given selected females for crossing. Breeding records on standard and uniform lines are kept at all centres where pure bred bulls are available, and, moreover, steps are being taken to ensure that pastures at these centres are also improved through the introduction of desirable varieties of fodder plants, and the rational use of mineral fertilizers.

(ii) Research Operations.

Experimental cultivaton of fodder grasses and plants has been steadily extended but results have been either unobtainable or unreliable owing to the drought which has prevailed throughout the year. A new experimental station is being established at sea-level at Palmar in Flacq district on the eastern coast of the Island for research operations regarding breeding for beef production and the effect of rational grazing on both pastures and animals. At the same time the station will offer to Breeders at large a valuable object lesson.

C.—IMPROVEMENT OF MARKETING OF ANIMALS AND ANIMAL PRODUCTS

51 surprise visits were paid to slaughter houses of the Colony by the Veterinary Officer. A cow slaughtered outside an abattoir was seized and the owner prosecuted. 120 cows and heifers of the milch breed, under 5 years of age, have been allowed to be slaughtered during the year, being unfit for reproduction.

D.—VETERINARY EDUCATION

Lectures were well attended to during the year by first and third year students of the Agricultural College. As in previous years the lectures comprised the following subjects: Anatomy, Physiology, Pathology and Animal Husbandry.

HEAD II

Statistical information concerning Livestock Industry.

A.—IMPORTATION OF ANIMALS

	From Dependencies		From Foreign Countries	
	1938	1937	1938	1937
Bovines	521	610	3,608	5,967
Equines		5	18	7
Pigs	1,804	2,315	1	—
Sheep	492	767	—	—
Goats	3,240	4,570	—	—
Dogs	—	10	2	5
Turtles	251	405		—
Cats	—			2
Turkeys	140	—		—
Poultry	20,158	28,767	7	—

B.—EXPORTATION OF ANIMALS

To Dependencies	1938	1937
Equine	2	5
Bovine	5	—
Goats	6	4
Donkeys	2	—
Pigs	2	—

In addition four race horses originally imported from England were exported to India and two milch cows of local bred were also exported to the latter country.

C. QUARANTINE

(1) Réduit Government Kennels.

One dog and one bitch of Scotch Terrier breed imported from foreign countries were subjected to the usual six months quarantine period and thereafter were delivered to their owner.

(2) Fort William Animals Quarantine Station.

Animals stabled there for observation were as follows:—

No.	Animal	Belonging to	Imported from	Exported to
1	Bull Africander	Department of Agriculture	South Africa	—
6	Heifers do.			
11	Bulls Africander	Stock Breeders Association	do.	—
1	Bull Charolais	Department of Agriculture	France	—
2	Heifers do.			
6	Bulls Charolais	Stock Breeders Association	do.	—
1	Grey Horse	Mr. Bax	Madagascar	—
1	Large white sow	Mental Hospital	South Africa	—
2	Milch heifers	Société Diégo		Solomon Islands
2	Catalane donkeys	do.	Rodrigues	do.
1	Heifer Africander	Department of Agriculture	South Africa	Rodrigues
2	Mares	Société d'Agaléga		Agaléga

After negative clinical and microscopical examination, these animals were delivered to their respective owners in healthy condition, when their legal quarantine period was over.

F. E. LIONNET,
Veterinary Officer.

GOVERNMENT DAIRY

Yield of Milk.

The amount of milk produced during the year was slightly lower than that produced in 1937 namely 86,382 litres as against 92,985 litres. The milk was distributed as follows:

	1938	1937
Supplied to Hospitals ...	12,402	... 15,459
Supplied to Public ...	69,917	... 72,714
Fed to calves	3,645	... 4,402
Samples for control ...	418	... 410

The demand from the public was particularly extensive during the later months and, owing to the persistance of the dry season, the output increased much more slowly than in previous years and consequently the " waiting list " was still crowded at the close of 1938.

Births.

Of the 31 calves which were born during the year, 17 were females and 14 males. Corresponding figures in 1937 were 36, 19 and 17, respectively.

Deaths.

Among adult animals, no death was recorded ; two calves, however, died during the year: one from nephritis and the other from general weakness two hours after birth.

Sales.

9 heifer calves and 12 bull calves were sold to breeders, the calves being delivered to purchasers within the first fortnight of their life. The demand for bull calves has shown steady improvement owing to the decision to sell them at the nominal rate of one rupee each at the age of five days to members of the Co-operative Credit Societies.

Of the adult animals, nine cows were sold to the butcher owing to old age, sterility or blind teats.

Abortion.

7 cases of abortion were recorded during the year as against 4 in the previous year.

Health Conditions.

The blood of the whole herd was examined several times during the year for the presence of parasites, chiefly trypanosomes and results were

negative. Tuberculin tests also proved negative, but the number of cases of retention of placenta after calving rose from 3 in 1937 to 8 during the year under review.

General Remarks.

The quality of the milk distributed was maintained at the usual high standard as evidenced by the satisfactory results of the chemical and bacteriological tests carried out at quarterly intervals during the year.

At the close of the year, a scheme was approved for the purchase of twenty local milch cows and their rearing at the Dairy, with the object of securing first hand information regarding *(a)* their milk yielding capacity under standard management relative to housing, feeding and milking *(b)* the hand-rearing of the calves and *(c)* the extent to which they could be improved in thier progeny by crossing with pure-bred Friesland bulls. To fulfil the latter object, one bull and four females of pure Friesland blood will be imported from South Africa to provide immediate requirement and also to supply pure-bred bulls for the future. The pure bred male progeny will, furthermore, be stationed in several localities throughout the Colony under Government supervision for use on small owners' milch cows. The scheme will provide definite information on the proper treatment to be given to local milch cows so as to obtain their maximum economic production and it will further benefit the small Indian cow-keepers in that they will soon possess highgrade Friesland cows of local origin.

YVES LEFÉBURE,
Officer in Charge.

Dr. PROFIT AND LOSS ACCOUNT FOR THE YEAR ENDED 31st DECEMBER, 1938. Cr.

	Rs.	Rs.		Rs.	Rs.
To Valuation 1st January, 1938, Live Stock	...	16,225.00	By Sales:		
,, Grain consumed	7,243.06	...	Milk	20,658.18	
,, Fodder	6,482.40	...	Manure	3,240.00	
		13,725.46	Sundries	46.12	
,, Litter	...	1,944.00	Live Stock	906.00	
,, Wages	3,027.80	...			24,850.30
,, Salaries	1,600.00	...	,, Valuation, 31st December, 1938, Live Stock ...		15,925.00
		4,627.80	,, *Loss for year ;*		
,, Travelling & Transport on Milk Deliveries	...	2,540.00	carried to Capital Account		2,059.11
,, Incidentals (including Water) ...	...	1,832.06			
,, Repairs	...	1,661.71			
,, Depreciation of Plant	...	278.38			
		42,834.41			42,834.41

BALANCE SHEET AS AT 31st DECEMBER, 1938.

Liabilities			Rs.	Rs.
Capital Account—				
as at 1st January, 1938	...	...	93,705.41	
Capital transactions during year—				
Excess of Payments over Receipts	...	... Rs. 1,945.63		
less Manure supplied to Agricultural Dept.	...	... 540.00		
			1,405.63	
			95,111.04	
less Loss for year, from Profit and Loss Account	...	...	2,059.11	93,051.93
				93,051.93

Assets			Rs.	Rs.
Land	...	...	6,000.00	
Buildings	...	...	62,500.00	
				68,500.00
Plant, Furniture and Fittings as at 1st January, 1938	...	...	4,117.18	
less Depreciation	...	...	278.38	
				3,838.80
Valuation, 31st December, 1938—				
Live Stock	...	... ...	15,925.00	
Grain	...	... ...	1,795.33	
				17,720.33
Sundry Debtors—				
Milk Sales, Public	...	... ...	1,390.30	
,, ,, Hospitals	...	... ...	252.50	
Manure Sales	...	... ...	1,350.00	
				2,992.80
				93,051.93

RODRIGUES

Climatic Conditions—Rainfall.

Months	Oyster Bay		Solitude		La Ferme	
	Inches	Rainy days	Inches	Rainy days	Inches	Rainy days
January	10.50	10	11.37	16		
February	5.94	14	6.42	19		
March	4.02	16	4.15	22		
April	2.18	10	2.23	15		
May	1.36	9	1.32	11		
June	4.33	19	4.15	17		
July	4.01	20	3.75	23	1.86	16
August	.74	5	1.26	14	.52	5
September	2.00	8	2.58	20	1.05	9
October	1.38	7	1.80	10	.61	2
November	.16	3	.23	4	nil	nil
December	.88	8	.99	5	.22	3
Total	37.50	129	40.25	176		

Highest rainfall in one day:
Oyster Bay on the 26th January: 3.98 inches.
Solitude ,, ,, : 3.77 ,,

2.—General Conditions.

The year 1938 will be recorded as one of the hardest experienced by the farmers owing to the very irregular distribution of rainfall.

Maize was planted at the end of January and replanted in June. In both cases the planting out had to be made late in the season and was followed by a more or less prolonged period of drought. Reduced yields were obtained generally from the the first crop and the second crop gave only very light returns.

In the central and western localities a third attempt at growing another crop in September failed completely.

Unlike the preceding years sweet potatoes and Manioc that would have proved more resistant, were not planted on a large scale in April and May owing to insufficient rainfall.

Adverse weather conditions coupled with the prevalence of Rust have been the cause of a high reduction in the yields of the bean crop.

Garlic showed an increased area under cultivation and onions were planted on about the same scale as the previous year. The yields obtained were reduced by about 40%.

The area planted with tobacco has again increased this year. Moderate yields were obtained generally. Owing to the necessity of limiting the production of tobacco leaf Government has passed legislation regulating the production and export of tobacco (Regulations made under Ordinance No. 5 of 1883).

As from the end of September, due to lack of rain, no planting whatever could be made. Large areas of lands remained uncultivated.

of the Cattle Walk.

3.—Relief Work.

ploying men and women on "Relief Work."

further on in this Report.

4.—Plant Disease.

and applying coal tar thereon are the steps taken as an attempt to control the disease.

was somewhat prevalent in the localities. Root disease has caused appreciable damage to the bean crop.

5.—Experimental Station.

and the servant's quarters.

propagator has been built.

Roads, drains and paths were maintained in good condition. The jetty was repaired and some steps have replaced the wooden ones that were in very bad condition.

Diseases noticed on "Edible seeds" have been confined to the fungus troubles of Cypress, Avocado and Paradise Bartolina in some plots of the Experimental Station.

Coconuts.—Seven new cases of "Knife cut" disease on coconut trees in the Demonstration plot at Oyster Bay have been discovered. The treatment as already described has been applied. Six inoculations have been made on trees that are to be cut at different intervals in order to obtain proofs of the latent spore and the mode of development of the disease.

Citrus.—The quarantine of all affected trees and a thorough inspection of the soil seem to have proved successful for the eradication of Footrot on citrus trees. No new case has been detected since the month of June. Grafting and budding of different varieties of orange have been carried out on sweet citrus stocks but the incidence of Citrus Canker on young fruit has been the cause of the budding up of any distribution of planting material on the public. Material selected from trees growing in localities free from the disease has been used for grafting Orange on local citrus trees in different parts of the Island.

Bread Fruit.—The solar propagator has been used for the raising of a great number of bread fruit plants but are to be distributed to the public as soon as ready for transplanting.

Cardamom pepper.—Rainfall has proved to be ample to withstand a prolonged dry spell. In spite of the drought the plants have made good growth. Seedlings have been raised for propagation.

Edible grass.—Showing hardy habit to the dry weather conditions.

Coral pea and Phaseolus radiatus.—The seeds that were introduced seem to be well suited to Rodrigues climatic conditions and are being encouraged.

Latania.—Seedlings are being raised for planting of an area of about 20 acres at Oyster Bay.

Sweet Potatoes.—Another variety "The Hundredfold" imported this year has given encouraging results. This variety together with the two other promising varieties (Seminole and Phenor) that have already been obtained are to be propagated. Fertilizers and Bordeaux have been received for the disinfection of seeds and plants next year.

Avocado pear, Mango and Peach.—Have been propagated either on seedlings, grafts or layers.

Vanilla.—The dry weather conditions had some ill effect on the vanilla crop. 7,500 pods from the crop of last year have been shipped to Mauritius.

Tobacco.—Was grown for the purpose of obtaining selected seeds for distribution. A seed separator has been received and has been placed at the disposal of the tobacco growers.

Any valuable information resulted from the experiments of several sorts that were carried out at the Experimental Station was as usual passed on to the farmers.

6.—Stock Farm.

New pig styes with a masonry wall and concrete floor have been built. Runs have been made for the turkeys and ducks. Repairs were made to the house of the Stockman.

Women enlisted on "Relief work" were employed in the destruction of weeds in the pasture grounds around the Stock Farm.

Cattle.

Sindhi :

Birth: 1 calf and 1 heifer.
Sold: 1 bull, 2 cows and 1 heifer.
Present number: 3 cows, 1 calf and 1 heifer.
Total: 5. No. of services: 2.

Friesland :

One bull died of pneumonia. One cow was imported and she gave birth to one heifer in August.
Present Number: 1 bull, 1 cow and 1 heifer.
Total: 3. No. of services: 9.

Afrikander : 1 bull and one heifer were imported.
No. of services: 3.

Donkeys.

Catalonian :

Birth: 3 Jacks and 1 jenny.
Death: 1 Jack.
Shipped to Mauritius: 1 Jack and 1 jenny.
Present Number: 5 Jacks and 14 jennies. Total: 19.

Pigs.

Large White :

Presnt Number: 1 boar.
No of services: 24.

Large Black :

Present Number: 1 boar.
No. of services: 19.

Large Black x *Large White :*

Sold: 1 sow.
Present Number: 1 boar.
No. of services: 10.

Yorkshire x *Large White :*

Death: 1 piglet.
Sold: 17 piglets (9 boars and 8 sows).
Present Number: 1 boar, 3 sows. Total: 4.

Sheep.

Black Head Persian :

Death: 1 ewe.
Present Number: 3 rams.
No. of services: 85.

Poultry.

The following have been imported from South Africa:

Plymouth Rock : 1 cock and 4 hens.
Rhode Island Red : 2 cocks and 6 hens.
Aylesbury duck : 2 drakes and 4 ducks.
Turkey : 2 cocks and 4 hens.

One Plymmouth Rock hen died. Eggs were sold to the public. Great satisfaction was generally expressed on the results obtained.

7.—Improvement of Pasture.

An area of about 20 acres in the south-western part of the Cattle Walk has been planted with trees with a view to providing shade for the animals. *Stenotaphrum complanatum* (herbe bourrique) is to be planted later on in the interlines of the Casuarina plantation. Owing to the unfavourable weather conditions a great number of young trees have died. Seedlings of Casuarina have been raised for recruiting and for the planting of another 30 acres of land near Baie Topaz.

An area of about 10 acres has been cleared of all undesirable plants and *Pennisetum longistylum* (Kikuyu), *Stenotaphrum complanatum* (herbe bourrique), *Pennisetum purpureum* (elephant grass) and *Chloris sp.* (Rhodes grass) planted. *Leucœna glauca* (acacia) and *Panicum maximum* (herbe fataque) have established themselves naturally on an area of about 2 acres planted with Terminalia arjuna (10 x 10).

Labourers paid under " Relief work " have been employed in the destruction of weeds chiefly Vetiveria sp., that were invading the pasture grounds at Vainqueur, Mt. Longue, Grand Bay and Mt. Grenade. An area of 200 acres has been dealt with.

Seeds of drought resisting varieties of Pasture grass have been ordered for from Australia.

Two drinking troughs have been built at Cascade Jean Louis and Piments. Stone walls were erected around the springs supplying water to the troughs to prevent pollution of water by animals. Another trough is nearing completion at Vangassailles. These troughs have proved their great utility in providing pure drinking water for the animals during the period of drought experienced this year.

8.—Extension of Coconut Plantations.

An area of 10 acres at Baie du Nord has been fenced by a wall 4 feet high and 349 coconut seedlings planted. The growth of the trees was seriously affected by the drought. 81 plants died.

Another 10 acres are being fenced on the east of the existing plantation and are to be planted next year with seedlings raised at the Experimental Station.

9.—Agricultural Education.

Demonstration of anti-erosion measures were given considerable prominence in this year's programme of work. Terracing and manuring of lands, digging of drains provided with silt pits and planting of deep rooted grass

alongside, were carried out partly on lands that were cultivated to prevent surface run off and partly on very badly eroded areas with a view to regenerating these wasted lands and rendering them suitable again for agriculture. On these lands, leucaena glauca has been planted in ridges alongside the contours or in holes 15' x 15' apart, so that the soil be kept under vegetation and later on these trees will serve as wind belts.

This work could be carried out more extensively this year as, besides the money provided for this purpose in the Estimates, fullest advantage has been taken of the availability of labour resulting from the enlistment of men on " Relief work."

All these measures notwithstanding their ameliorative effects, are helping to a great extent in the agricultural education of the rodriguean farmers, who have been employed in great number on works connected with prevention of soil erosion. These farmers could not be afforded a better opportunity of familiarizing themselves with the systems that are to be employed to maintain or restore the fertility of the soil.

A Prize Holding Scheme for the awarding of prizes to those farmers who have employed the best methods of cultivation has been held.

46 entries were received and 18 prizes amounting to Rs. 254 were awarded. When judging, the varieties of crops, trees planted, general appearance and cleanliness, methods of cultivation, control of erosion and application of manure were taken into account.

Many competitors from the central and eastern localities lost marks for not having applied manure to their fields and their attention was specially drawn to the great importance that will be attached in future to this point.

During the meetings that were held on several occasions for discussing with farmers various subjects concerning agriculture and breeding, and during the visits paid frequently by the Agricultural Superintendent to the holdings of farmers or to the herds of breeders, advice was constantly tendered for the adoption of improved cultural methods or proper management of herds.

10.—Irrigation.

After plans, designs and estimates had been made, the project of building an irrigation reservoir at La Ferme was found impracticable and had to be abandoned. Further investigations are to be made to find out suitable sites with adequate catchment areas.

11.—Shipment of Cattle.

A gangway has been built alongside the jetty at Port Mathurin, to lead the cattle towards the crane that is now being used for lifting the animal before placing it in the lighter. This new mode of proceeding is a great improvement over the methods of shipping that were employed previously.

12.—Visits.

The Island was visited in May by the Veterinary Officer, in September by the Plant Pathologist and in November by the Assistant Conservator of Forests. Every effort has been made to assist these officers in the performance of their duties. Tours of inspection were arranged and they were generally accompanied by the Agricultural Superintendent.

13.—Exports.

	1938	1937
Acacia seeds	9,402 Bags	10,107 Bags
Beans	450 ,,	506 ,,
Maize	537 ,,	1,284 ,,
Garlic	488 ,,	377 ,,
Onion	2 ,,	57 ,,
Peas	1 ,,	2 ,,
Tobacco	716 Bales	628 Bales
Vanilla	1 case and 18 kg.	1 tin
Citrons	139 Bags	—
Lemons	10 ,,	—
,, preserved	5 cases	15 cases
Coconut	21 Bags	—
Coffee	1 ,,	—
Gum	8 ,,	8 Bags
Timber	204 pieces	188 pieces
Cattle	537 heads	596 heads
Goats	3,733 ,,	4,593 ,,
Pigs	1,934 ,,	2,303 ,,
Sheep	623 ,,	741 ,,
Turkeys	505 ,,	424 ,,
Fowls (including ducks and guinea fowls)...	34,698 ,,	33,140 ,,
Donkeys	2 ,,	1 ,,
Guano	279 tons	203½ tons
Hide	11 Bales	8 Bales
Manure	2¾ tons	67¾ tons
Salt Fish	4,064 Bales	3,866½ Bales
Octopus	708 ,,	807 ,,
Dogs	40 heads	28 heads

RENÉ JAUFFRET,
Agricultural Superintendent.

PART III

1.—Staff Movements.

Honourable G. E. Bodkin, Director of Agriculture, returned to the Colony from leave of absence in Europe on the 26th June, 1938, and resumed duty the next day.

Mr. G. C. Stevenson was appointed Geneticist of the Sugarcane Research Station on the 1st July, 1938. He arrived in Mauritius on the 27th July, 1938, and assumed duty the day after.

Mr. P. O. Wiehe, formerly Master at the Royal College, assumed duty as Plant Pathologist in the Department, vice Mr. E. F. S. Shepherd transferred to the Gold Coast, on the 14th April, 1938.

Mr. L. Baissac, Sugar Technologist was seconded for a special mission in South Africa to study the application in that country of the method of purchasing planters' canes on a qualitative basis. He left on the 3rd July, 1938, and returned to the Colony on the 28th of the same month.

Dr. F. E. Lionnet, Veterinary Officer, and Mr. O. Wiehe, Plant Pathologist, went on inspection visits to Rodrigues. The former proceeded to that Dependency on the 6th May and returned on the 1st June, 1938, while the latter left on the 8th September and came back on the 3rd Ocotber, 1938.

Mr. J. H. Nicolin, Chief Clerk, who had been appointed Secretary of the Organising Committee of the Mauritius Section of the Foire-Exposition of St. Denis, was on the 27th August seconded on mission at Réunion as Officer in charge of the Mauritius Pavilion. He returned to Mauritius on the 5th November.

Mr. A. Moutia, Assistant Entomologist, left on mission for Zanzibar, France and North Africa in search of Phytalus parasites on the 28th January, 1938.

Mr. F. Berchon, Assistant Chemist, returned from European leave on the 28th January, 1938, and resumed duty on the same date.

Mr. R. Avice, Assistant Sugar Technologist, visited the Island of Réunion to investigate the fuel alcohol industry. He accordingly left Mauritius on the 27th August and returned on the 10th September, 1938.

Mr. A. Valasois, Assistant Agricultural Officer, left on leave of absence to be spent in Europe on the 17th May, 1938.

Mr. E. Bedsy, Agricultural Instructor, was sent to Rodrigues for work in connection with the Co-operative Credit Societies movement in that

Dependency. He left on the 11th January and returned from that Island on the 1st of March, 1938.

Consequent on a grant received from the Colonial Development Fund in connection with the control of the Moth Borers of the sugarcane, Mr. J. Vinson, Scientific Assistant in the Entomological Division, proceeded to Ceylon and India on the 6th December, 1938, in search of parasites to combat this insect pest.

Mr. P. Régnard, Second Phytalus Officer, went on a second mission to South Africa for the purpose of collecting phytalus parasites and left this Colony accordingly on the 1st of September, 1938.

Mr. E. Emile, I Grade Clerk, was promoted Special Grade Clerk on 1st July, 1938, and transferred to the Immigration and Poor Law Department. Mr. S. Aubeeluck was consequently appointed I Grade Clerk and assumed duty in this Department on the 29th August, 1938.

Consequent on the appointment of Mr. R. Chang Kye as I Grade Clerk at the Registrar General's Department Mr. M. Savrimoutou, II Grade Clerk, was transferred to this Department where he assumed duty on the 29th August, 1938.

Mr. M. Bell was appointed to the newly created post of Clerical Assistant Grade II on the 1st of July, 1938, and assumed duty on the same date.

Mr. M. Maree II Grade Clerk, proceeded to Madagascar on leave of absence on the 23rd October, 1938.

Mr. L. Humbert, Overseer, was granted leave of absence to be spent in Mauritius and Réunion. He accordingly left for that Island on the 21st June, and returned on the 28th July, 1938, and finally resumed duty on the 23rd December, 1938.

2.—Stations.

The headquarters, offices and laboratories of the Department of Agriculture are located at Réduit, some 1,000 feet above sea level. The following principal areas of land are utilized and controlled by the Department for experimental field work in all its various phases ; Réduit 34.86 arpents ; Barkly (altitude 700 feet), 13.7 arpents ; Mon Plaisir, Pamplemousses, (altitude 220 feet), 9.62 arpents ; La Ferme (altitude 420 feet), 12.82 arpents ; Richelieu (altitude 218 feet), 59.44 arpents.

A number of minor areas in different parts of the Island are leased or occupied rent free for experimental work, principally in connection with sugar and pineapple. The local " arpent " is slightly greater than the English acre.

3.—Revenue and Expenditure.

REVENUE

Department of Agriculture.

	Rs. Cs.
Sale of Plants	2,290.95
,, Sugarcane	4,918.45
.. Pineapples and Pineapple Plants	2,169.95
,, Tobacco Leaf	1,193.86
,, Pois Mascate	447.50
,, Potatoes	102.46
,, Paddy	4.75
,, Vanilla	276.28
,, Litchis	471.25
,, Eggs	6.00
,, Cyanogas	1,340.00
,, Dairy Produce to the Public and Govt. Hospitals ...	20,457.15
Analytical Fees	289.00
Rent of Land	876.53
Miscellaneous	341.50
Contribution from Co-operative Credit Societies	750.00
Contribution from Agricultural College Funds towards cost of Sugarcane Research Station	18,000.00
Contribution from Agricultural College Funds towards Salaries and Allowances of Officers of the Department of Agriculture...	23,150.00
Contribution from Agricultural College Funds towards pension of Lecturers at the Agricultural College	6,210.00
Contribution from Sugar Industry Reserve Fund towards cost of the Sugarcane Research Station	11,800.00
Special cess on Sugar Exports for Phytalus destruction (Ordinance No. 38 of 1933)	90,891.99
	Rs. 186,287.62

DEPARTMENT OF AGRICULTURE

EXPENDITURE

	Rs. Cs.
Personal Emoluments	239,923.27
Maintenance of Gardens	6,479.47
Prevention of Plant Pests and Diseases	3,115.18
,, ,, Animal Diseases	1,145.72
Upkeep of Stock	9,457.69
Maintenance of Experiment Stations	22,205.51
Apparatus, Chemicals and Laboratory Supplies	3,099.72
Nursery	2,912.77
Destruction of Phytalus	38,525.86
Registration of Agricultural Chemists	100.00
Upkeep of La Ferme Tobacco Experiment Station	5,499.01
Telephone	144.17
Travelling	16,844.36
Railway Services	2,114.54
Passages	6,461.34
Incidentals	904.89
Government Dairy	24,161.79
Prevention of soil erosion, Rodrigues	1,612.05
Purchase of Livestock for Rodrigues	1,922.42
Importation of Cattle for beef production...	31,343.34
Pasturage Research	2,512.78
Purchase of the " Bourgault Fly trap " Patent Rights ..	5,500.00
Travelling of Members of the Committee appointed to investigate the possibility of purchasing planters' canes on a qualitative basis	262.90
Development of Agricultural Industries	4,260.32
SUGARCANE RESEARCH STATION.	
Laboratory Equipment	2,550.88
Labour and Field Equipment	9,677.12
Travelling and Railway Services	1,932.77
Cultivation and Manurial Experiments	2,946.70
Incidentals	488.91
	Rs. 448,105.51

4.—Legislation.

The following Proclamations and Government Notices were issued during the year:

Proclamation No. 1 of 1937.—To remit stamp duties and Registration Fees chargeable on Instruments executed by or on behalf of " The Bois Chéri Co-operative Credit Soicety."

Proclamation No. 4 of 1938.—To remit stamp duties and Registration Fees chargeable on Instruments executed by or on behalf of " The Camp de Masque Village Co-operative Credit Society."

Proclamation No. 19 of 1938.—To provide for the treatment of a pine-apple plant disease.

Proclamation No. 34 of 1938. To remit stamp duties and Registration Fees chargeable on instruments executed by or on behalf of "The Trois Illots Co-operative Credit Society."

Government Notice No. 30 of 1938.—Rules made by the Governor in Executive Council under Art. 13 of the Co-operative Credit Societies Ordinance, 1913.

Government Notice No. 35 of 1938.—Amendment made to Sections 1 and 3 of the Rule framed under Art. 31 of the Co-operative Credit Societies Ordinance, 1913, as amended by Ordinance No. 13 of 1916.

5.—Board of Agriculture.

The Board of Agriculture established under Ordinance 30 of 1912 consisted of:—

His Excellency the Governor, *President*.
The Director of Agriculture, *Vice-President*.

The following members were appointed for 1938:

The Honourable Mr. R. Gujadhur.
,, ,, ,, J. Leclézio, C.B.E.
,, ,, ,, P. Hugnin.
,, ,, ,, T. Mallac.
,, ,, ,, H. G. Robinson.

Mr. G. Antelme.
.. J. de Spéville.
.. G. Clarenc.
,, H. G. Ducray.
,, L. Larcher.
.. Pandit Boleram.
,, P. de Sornay, *Chevalier de la Légion d'Honneur*.
Mr. F. Nichols.
,, H. Lincoln.
,, R. M. Monk.
,, L. H. Garthwaite.
,, A. Lagesse.
,, F. N. Coombes.

There was no meeting of the Board in 1938.

6.—Publications.

The following departmental publications were issued during the year:

LEAFLETS.

(a) A manurial trial with Pineapples.
(b) Unlimited Liability. Its Advantages and safeguards.

REPORTS.

(a) Annual Report of the Department of Agriculture for 1937.
(b) Report of the working of the Co-operative Credit Societies for the Year ending 30th June, 1938.
(c) Report of the College of Agriculture for 1937.
(d) Final Compilation of Sugar production for the 1937 sugar crop.
(e) Preliminary Forecast of the 1938 sugar crop.
(f) Revised Forecast of the 1938 sugar crop.
(g) Preliminary compilation of sugar production for the 1938 crop.
(h) Eighth Annual Report of the Sugarcane Research Station for the Year 1937.

DEPARTMENT OF AGRICULTURE

The following articles from Officers of this Department were published in the Revue Agricole:—

1. Les turbines centrifuges à grand rendement, by R. Avice.
2. Sur la présence de Perkinsiella Saccharicida Kirkaldy à l'Ile Maurice by Jean Vinson.
3. L'antagonisme entre la Betterave et la Canne, by Louis Baissac.
4. L'Isolement des Inflorescences de la Canne à Sucre en vue d'effectuer des croisements by H. Evans.
5. Le défécation dans la fabrication du sucre roux, by R. Avice, A.R.T.C.
6. Résultats d'un Essai Comparatif d'Engrais effectué en 1937–38 à Mon Trésor, by A. North Coombes.

7.—General.

The Director of Agriculture served as a member of the Council of Government. He acted as Chairman of the Agricultural College Board, the Phytalus Advisory Committee, the Tobacco Board, the Allotments' Organisation Committee, and the Research Advisory Committee of the Sugarcane Research Station. He also served on the following Boards and Committees: The Board of the Mauritius Institute, the Forest Board, the Customs Tariff Advisory Board, the Mauritius Hemp Producers' Syndicate (Executive Committee), The Stock Breeders' Association, the Finance Committee of the Council of Government and the Fisheries Permanent Advisory Committee.

APPENDIX

MEAN MONTHLY RESULTS OF METEOROLOGICAL OBSERVATIONS TAKEN AT THE STATIONS UNDER THE CONTROL OF THE DEPARTMENT OF AGRICULTURE

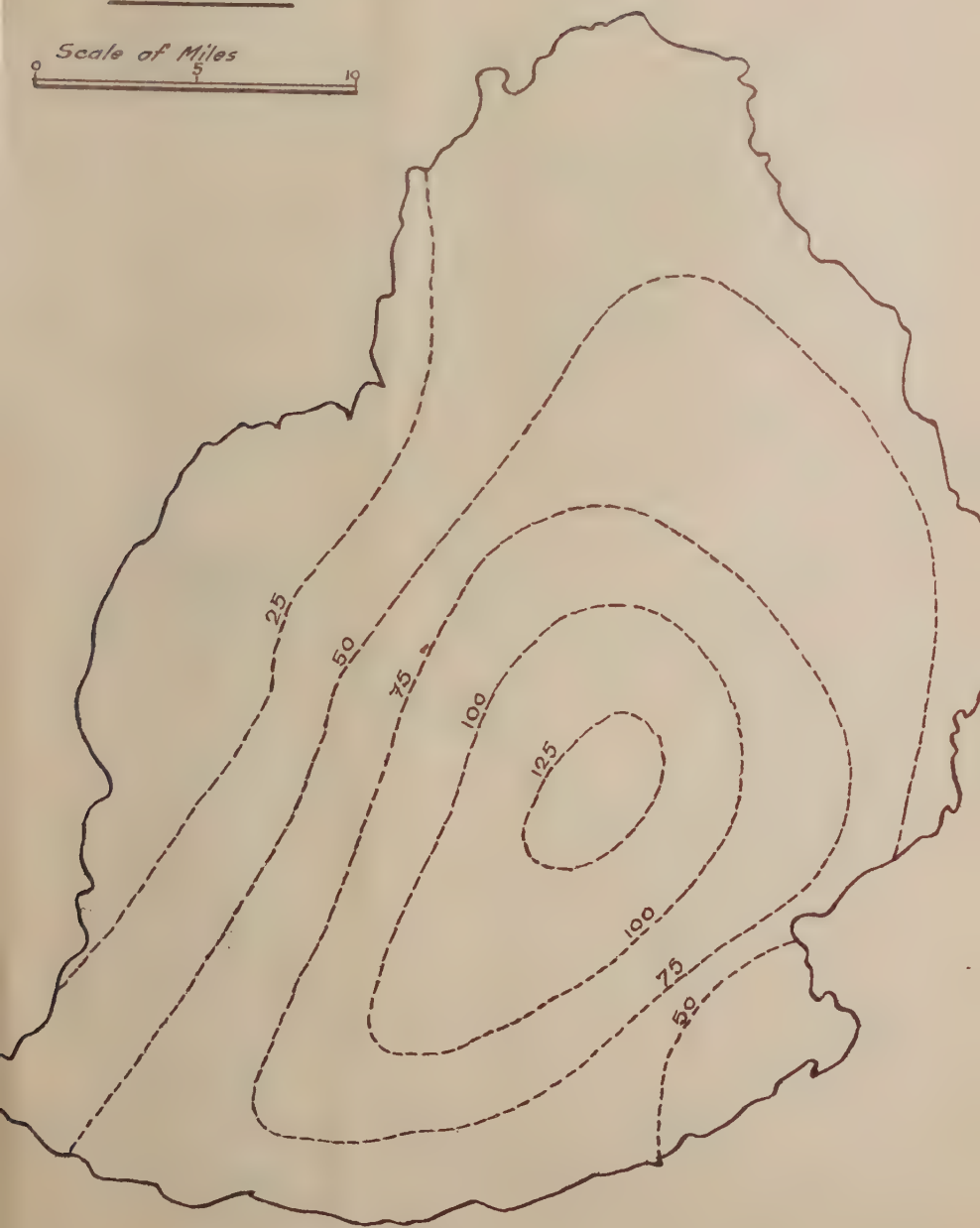
STATIONS AND ELEMENTS	JANUARY TO DECEMBER, 1938												Totals	Means
	1	2	3	4	5	6	7	8	9	10	11	12		
Central Experiment Station, Réduit—														
AIR TEMPERATURE, Minimum °C	21.5	21.8	21.9	20.0	18.1	16.0	15.7	14.2	15.0	16.8	17.2	19.2	—	18.1
Maximum °C	27.8	27.9	27.0	25.5	24.5	24.5	24.3	24.8	22.6	24.2	25.8	27.5	—	24.8
Mean °C	24.2	24.6	24.1	22.1	20.9	18.1	18.8	17.6	18.1	19.8	20.9	22.8	—	21.0
RELATIVE HUMIDITY, Percentages	66.8	70.5	72.0	72.6	71.8	70.7	73.7	65.6	64.2	62.5	58.5	58.6	—	67.3
RAINFALL, Depth of Rain, mm	71.2	235.1	261.5	61.8	133.2	39.5	52.5	31.9	17.1	45.3	32.6	22.2	1,002.1	—
No. of Days of Rain	17	18	22	18	21	21	23	17	20	23	19	14	233	—
SUNSHINE, Registered sunshine, hours	256.8	227.1	232.3	177.8	122.9	241.4	190.5	229.9	225.1	253.3	245.2	248.2	2,747.5	—
Percentage of Possible	63.0	63.8	61.6	51.1	64.6	73.8	55.8	65.1	62.9	65.9	62.8	59.1	—	62.5
Botanical Gardens, Curepipe—														
AIR TEMPERATURE, Minimum °C	20.3	19.6	20.1	19.1	16.5	14.9	14.8	13.7	14.1	15.6	16.0	18.6	—	16.9
Maximum °C	26.3	26.1	26.0	25.3	23.7	20.1	19.6	20.8	20.8	21.9	23.3	24.9	—	23.1
RELATIVE HUMIDITY, Percentages	82.4	79.7	85.9	85.6	87.2	82.4	87.0	81.3	79.1	80.7	72.9	67.5	—	80.9
RAINFALL, Depth of Rain, mm	331.0	402.8	139.5	292.3	250.2	216.8	252.5	125.0	106.3	214.5	116.5	114.3	2,861.7	—
No. of Days of Rain	27	24	30	26	31	30	31	30	29	29	20	16	323	—
Barkly Nursery, Beau Bassin—														
AIR TEMPERATURE, Minimum °C	21.9	21.9	22.1	19.9	18.1	15.6	15.9	15.0	14.7	17.0	17.2	18.8	—	18.2
Maximum °C	30.7	30.9	30.5	30.9	28.2	24.5	23.6	24.5	25.5	27.0	27.9	28.7	—	27.7
RELATIVE HUMIDITY, Percentages	62.0	67.1	68.5	63.3	67.6	70.5	71.2	67.1	62.0	59.9	58.5	60.3	—	64.8
RAINFALL, Depth of Rain, mm	43.2	176.5	189.7	40.5	124.9	7.5	30.2	12.2	5.8	19.9	14.0	17.1	681.5	—
No. of Days of Rain	13	16	15	11	13	4	8	4	4	9	3	7	107	—
Abercromby Nursery, Port Louis—														
AIR TEMPERATURE, Minimum °C	23.8	23.5	23.5	21.5	20.6	18.9	19.3	17.3	18.5	20.7	21.4	21.9	—	20.9
Maximum °C	32.6	32.1	31.0	29.7	28.9	26.0	24.0	26.8	27.1	28.6	29.5	31.3	—	29.0
RELATIVE HUMIDITY, Percentages	58.7	62.9	68.1	64.6	63.9	59.9	62.7	55.1	54.2	51.5	48.8	50.6	—	58.4
RAINFALL, Depth of Rain, mm	58.8	191.3	177.4	87.5	63.3	9.3	28.7	19.9	10.8	19.3	14.6	22.8	703.7	—
No. of Days of Rain	17	15	21	18	15	5	16	15	11	14	11	12	170	—
Royal Botanical Gardens, Pamplemousses—														
RAINFALL, Depth of Rain, mm	106.5	249.5	227.5	169.0	112.3	29.7	75.8	49.0	33.5	17.0	39.5	69.6	1,178.9	—
No. of Days of Rain	16	10	17	15	12	6	14	14	12	10	10	12	148	—

Remarks.—The figures for Relative Humidity are the means of readings at 9h. and 15h. Temperature figures, at Réduit, are obtained from hourly measurements of thermograms standardized daily at 9h. and 15h. At the other stations, maximum and minimum thermometers are read daily at 9h. and 15h. Rainfall is measured at 9h. and the amount entered for the day.

RAINFALL MAP
for the Year 1938.

Isohyets drawn at 25" interval.

Scale of Miles
0 5 10



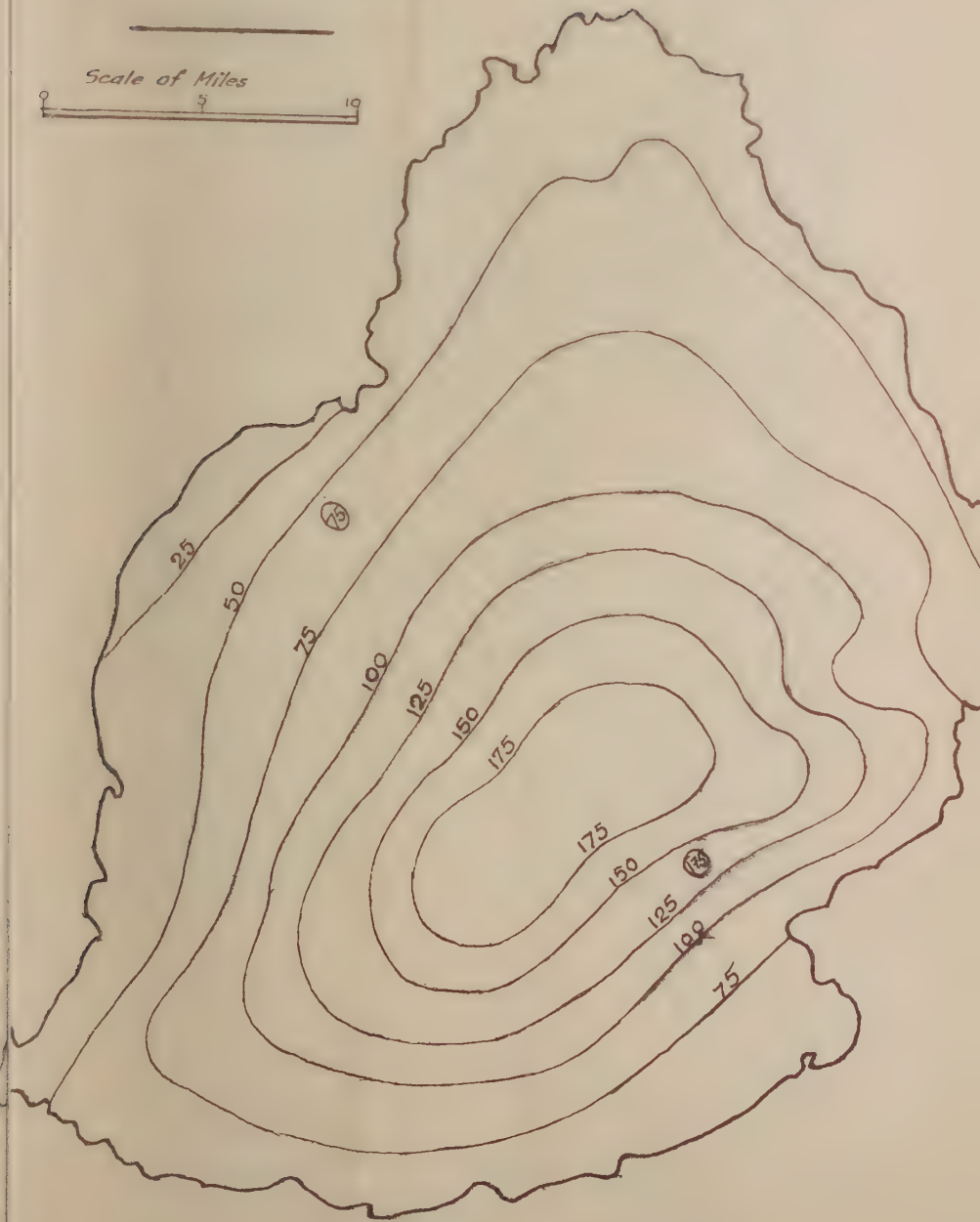
RAINFALL MAP

for the average 1904-1933

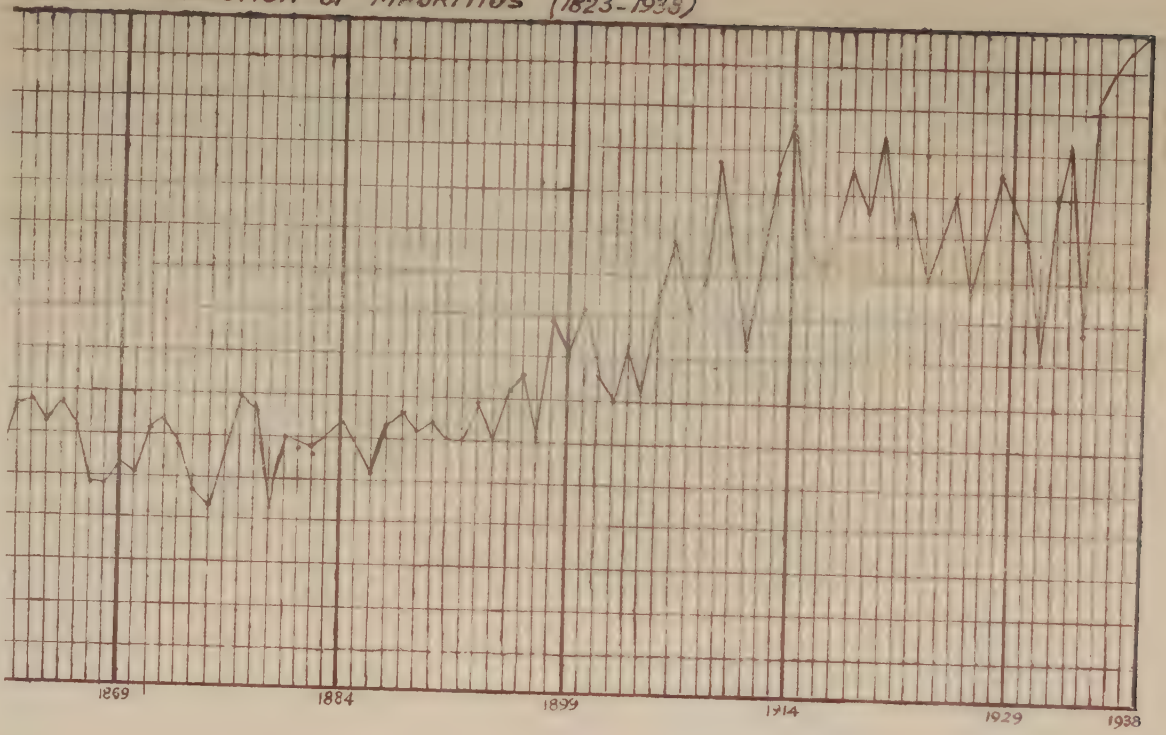
Isohyets drawn at 25" interval.

Scale of Miles

0 5 10



SUGAR PRODUCTION OF MAURITIUS (1823-1938)



Number of Sugar Factories.
300
280
260
240
220
200
180
160
140
120
100
80
60
40
20
0
1821-25
1826-30
1831-35
1836-40
1841-45
1846-50
1851-55
1856-60
1861-65
1866-70
1870-75
1876-80
1881-85
1886-90
1891-195
1896-100
1901-05
1906-10
1911-15
1916-20
1921-25
1926-30
1931-35
1936-38